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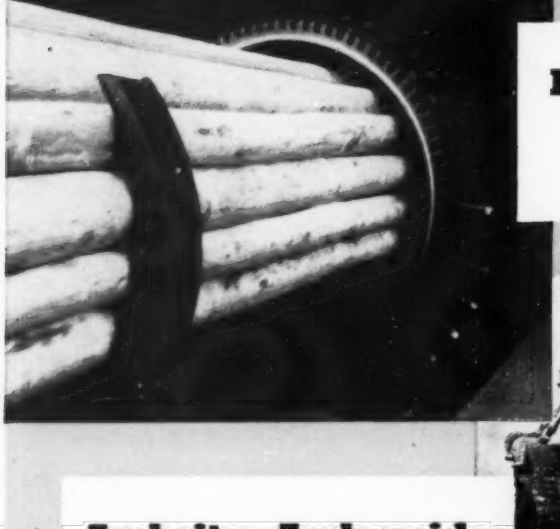

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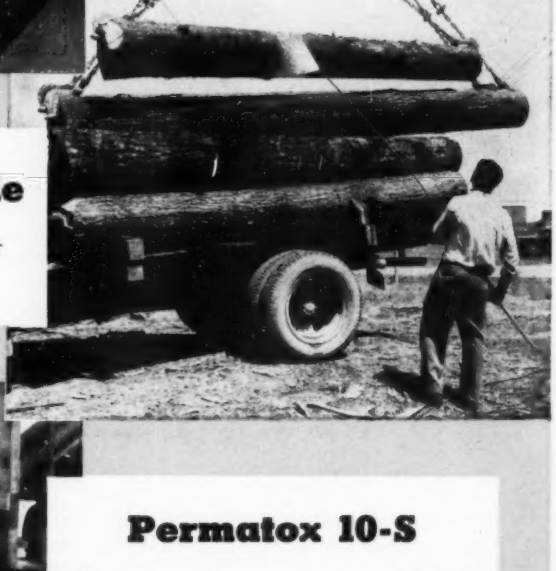

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Cooperative Forest Management in the Olympics

W. B. Greeley

Late in 1946, the U.S. Forest Service made a hundred-year contract with the Simpson Logging Company. It provided unified management for 270,000 acres of federal and private woodlands in the South Olympics in the State of Washington. The proposal was praised at the time as a far-sighted use of public resources to spread out sustained yield forest practices and stabilize lumber-born communities. There were also some who criticised, saying that the deal created monopoly since one concern would be given first call on a vast area of the people's timber, without competition. The Forest Service leaders faced their critics with the courage of conviction that wrote Public Law 273 in 1944; and thus was launched one of the most intriguing try-outs of cooperative forestry ever undertaken in the world. What results from this bold venture can be seen today, at the end of the first four years in the hundred?

The Shay locomotive at the gate of the Simpson mill is a symbol of the past—having served its time in the woods during the days of railroad logging, it is now used as a switching engine in the Shelton yards. The tall stack in the right background, towers 375 feet. From it emits white smoke which is all that is left of the waste liquors of the Rayonier, Inc. whose operation is integrated with that of the Simpson mill for better utilization. The waste liquors are burned to avoid water pollution.

FIRST A WORD on the practical benefits of merging these two particular tracts of land under single management. Uncle Sam had 4 billion feet of old timber but almost no growing land. Simpson had a billion feet of virgin stumpage plus over 110,000 acres of young forest, mainly in the 30-year age class. The latest samplings show that this young forest is making a net yearly growth of 900 board feet per acre on the better sites and of 700 board feet on the average. If each property were operated independently on its own resources, the government could maintain a sustained production of around 40 million feet while Simpson would be compelled either to quit after another decade of running its present mills or to start immediately a drastic curtailment of production and employment. By combining Simpson's young forest with Uncle Sam's old timber, it was possible in 1946 to figure an unbroken production for the next century, of 90 million feet a year.

Present indications point to an increase in this allowable cut before the operation has progressed very far into the century. Gains in over-all growth are accruing from land acquisitions by the company within the working circle, from tree planting, and from stand improvement cuttings in the older age classes of second growth. A more intensive typing of site qualities also indicates that previous growth estimates were low. The first step of the company, after signing its contract with the chief of the Forest Service, was to make an aerial survey of its entire property. From this survey and intensive ground checks on 10,000 acres,

a detailed type map has been completed on a scale of 4.4 inches per mile. Here is the starting point of real management — growth estimates, thinning and harvesting plans, planting programs, projected roads, and the rest of it.

Operating Methods

The virgin stand is being cut clean by "staggered settings," the clean-cut patches ranging from a few acres in size up to a maximum of 80 acres. Under this method, from 40 to 50 percent of the forest is left on the first round, for reseeding and protection from wind and fire. Other patches will be cut at future intervals; and the operation has been shifted from railroad spurs to permanent truck roads for hauling logs to railheads. In the past 4 years, Simpson has built 74 miles of truck roads conforming with Forest Service specifications.

Systematic thinning has begun in stands of second growth of approximately 60 years and upward. This is primarily for stand improvement, taking around 20 percent of the volume—in wolf trees, dead or defective stems, etc.; but such thinnings are paying their way. A harvest cut in second growth is not planned on most sites short of an age of one hundred years. Experimental thinnings have been conducted on 50 acres of sample plots in second-growth stands from the 30- to 40-year age class. These have furnished costs, methods, and yields on which early thinings can be made a general practice whenever it is possible to market the classes of material they provide. In addition 320 acres of Simpson's second growth is being managed by the U. S. Forest Service experiment station as a demonstration forest, to encourage better forest management of small woodlots and farm forests. Simpson's seventeen permanent sample plots are funishing cumulative data upon the effect of thinning in varying degrees upon the growth of young stands.

Tree Planting

Continuing the policy begun years before its cooperative agreement, Simpson has planted nearly 5,000 acres in the 4 years of the contract. The average cost of planting 700 trees per acre in 1950 was $18. Experiments in direct seeding, after rodent poisoning, have been conducted also on 100 acres. The company is committed to maintain a stocking on its lands satisfactory to the government and to plant where necessary. Future planting will run about 1,000 acres a year. Under a former survey, about 3,000 acres more must be planted or seeded; but this figure is being revised in the intensive typing following the aerial survey.

Protection from Fire

Under the compulsory law of Washington, the over-all protection of Simpson's tree farm has been contracted to the State Department of Forestry at the standard rate of 5 cents per acre. Eighteen cents more per acre is expended for supplemental protection in maintaining lookouts, protection roads, and fire breaks, and in keeping standby crews and equipment available for any fire emergency. This service is discharged by the South Olympic Tree Farm Company, an interesting development of the tree farm movement in the Pacific Northwest. Through the South Olympic Company, several large owners of second growth, whose lands adjoin and are partly intermingled, have pooled their protection activities for economy and efficiency.

Like the Northwestern operations generally, Simpson's logging camps are equipped with portable power pumps, tank cars and trucks, bulldozers kept in readiness for fire calls, and complete caches of hand fire tools. Its fire record reads like a forester's dream or the inspired advertising of a devotee of John Barleycorn. Believe it or not, due to the good work of the South Olympic Tree Farm and to the fine cooperation of the public, they have had only nine small fires during the past 8 years, which burned all of 43 acres on Simpson's second growth land.

The Working Men and Their Communities

Much was said in the hearings on Public Law 273 and the much hotter discussions preceding the Simpson agreement about stability of employment and man-days of labor per unit of wood. What do the 4 years indicate on this phase of forest management?

The Simpson employees in the Shelton Working Circle totaled 2,047 people in 1950. Their average yearly earning was $3,575. During the past 3 years, employment has been stabilized at close to 20 year-long workers for each million feet of timber felled in the woods. The average employment at West Coast logging camps and green sawmills is between seven and eight year-long workers per million feet of timber.[1] The additional 12-odd workers at Simpson for each million feet of logs, is a fair yardstick both of the degree of utilization and of the stake of the community in integrated manufacture of forest products.

Put in another way, 21 man-hours of labor go into the processing and selling of every thousand feet of logs manufactured under the Shelton agreement, plus 5.9 man-hours expended in logging it. Every worker in the woods makes possible jobs for 3.5 workers in the various mills and fabricating plants. That ratio is far ahead of forest industry averages in the Pacific Northwest.

The lumber towns of Shelton and McCleary reflect the stability of payrolls underwritten by a sustained supply of raw material. They are not company towns. When Simpson acquired the McCleary mills in 1942, it took the lead in incorporating the community and in transferring the homes on the mill properties into employee ownership. Both towns are growing and progressive. Their combined building permits have averaged $800,000 each year since the cooperative sustained yield agreement was made. Both are communities of employee-owned

[1] Marquis, Ralph W. Employment opportunities in full forest utilization. Jour. Forestry 46:334-339. 1948.

homes. In Shelton 75 percent and in McCleary 90 percent of the residences are occupied by their owners.

The Mason County Forest Festival, held in Shelton every May, is one of the most telling demonstrations of "Keep Washington Green." Over 500 school-age youngsters in the county take part in a great pageant about trees. Its climax is always the overcoming and dramatic punishment of the forest-fire demon. Those people have a clear understanding of what the forests mean to them and to their communities.

Integrated Utilization of Timber

It has always seemed to the writer that one of the main justifications for the commitment of a large body of government timber to a single operator, without future competition on price, should be to demonstrate advanced methods of wood utilization. Part of the return to the public should be the trying out of new ideas, testing of manufacturing techniques, and risking of capital investment necessary in the forward march of regional utilization. This factor has special weight in the Pacific Northwest where the progress of the region in stable industries, forest protection, and tree-growing practices has been handicapped at every turn by enormous accumulations of unmarketable wood. But in the United States generally, the levels of forest practice and gains in forest growth depend directly upon the markets created by the wood technician. What better use of some modest part of the federal timber than to serve as the practical means of bringing about new and advanced utilization facilities?

This philosophy was, of course, implicit in Public Law 273. It is implicit in the agreement for the Shelton Working Circle. No one had a better understanding of the necessity for integrated utilization in the South Olympics than Simpson's far-sighter builder, Mark E. Reed. Mr. Reed was instrumental in bringing to Shelton the sulphite pulp mill now operated by Rayonier. When Simpson acquired the Henry McCleary holdings, a sawmill, a plywood plant and a door and general wood-fabricating factory, in McCleary, were added to the company's one sawmill and Olympic plywood plant, both in Shelton. The Olympic plywood plant, in 1951, was equipped with an additional dryer and improved lathe which peels second-growth logs of 16-inch diameter and larger. A wood fiber plant was brought into production in 1947, after prolonged research and many pilot tests. Its mechanically ground fiber is produced from the lumber and plywood leftovers at the four other mills, and is pressed into 250,000 square feet of insulation board and acoustic tile daily. A hydrapulper, installed at this plant last year, recovers and repulps all reject fiberboard and puts it to use again.

Simpson sells hemlock pulp logs to the Rayonier mill in Shelton, and its small cut of western red cedar to lumber and shingle mills. Every other stick brought in from the woods is manufactured at one or another of its own plants, usually at several of them before the process is finished. The door factory fascinates a visitor with its gluing of little pieces of wood into cores for door stiles and rails, to be overlaid with veneer; and its sandwich panels of fiberboard between exterior plies of veneer. Something new is under study or test all the time, like the use of bark in some types of insulation board or the markets for defibered wood to be dried and cleaned and shipped like bales of cotton.

The present use of logs that come to the mills is so complete that sufficient wood is not available to burn for steam, as was formerly done. Oil is now used to supplement the bark and slabs unusable for anything but fuel. But in the woods, utilization is still far from complete. Desirable thinnings on many thousand acres of overdense young Douglas-fir will yield an enormous volume of excellent fiber when they pay their way to market. The answer may be found in the manufacture of sulphate pulp, or it may come in the amazing expansion of markets and uses for whole wood fiber produced by mechanical processes.

However the dust may settle in the use of Public Law 273, and whatever burnt offerings we may lay at the feet of our idol, Competition — sustained yield in the Shelton Working Circle will, I trust, carry on as an illustration of the far horizons of cooperation possible between the United States government and private industry.

The Cover Photograph

Taken within the cooperative sustained yield unit, the cover photograph shows approved technique of logging of Douglas-fir in the watershed of the Wynooche River. Six settings, varying in acreage to fit logging requirements, are shown. The men in the foreground are officials of the Simpson Logging Company and of the U. S. Forest Service inspecting the operation.

Uses of Aerial Photographs in Forest Protection

At a meeting of the American Society of Photogrammetry, held at the Sir Francis Drake Hotel, San Francisco, Calif. December 5, 1950, a highly significant panel discussion was held on the use of aerial photography in forest protection. Given below are abstracts of the statements made by various members of that panel. Space limitations prevent publishing here the excellent aerial photographic illustrations which the speakers presented. In addition to the panel on forest protection, a number of other papers of value to forest photogrammetrists were presented.[1]

Introductory Remarks

Robert N. Colwell

Assistant professor of forestry, University of California, Berkeley, chairman of panel.

THIS PANEL DISCUSSION is believed to constitute the first systematic discussion ever held regarding the use of aerial photographs in forest protection. Each member of panel not only is an expert in his phase of forest protection, but has helped pioneer many of the research accomplishments on which he is reporting. Like all pioneers these men have an enthusiastic attitude toward their work. Such enthusiasm sometimes leads to undue optimism. However, your chairman and others who have been privileged to work with these men, both in the woods and through the stereoscope, believe their work to be scientifically sound and their optimism fully justified.

The ever-increasing demand being made upon this country for wood and wood products makes it mandatory that no tool be overlooked which may help protect our nation's supply of commercial timber from destruction by fire, insects, and diseases. These three destructive agents are currently responsible for approximately 10 percent of the total annual drain on our forests, despite long-continued efforts in the field of forest protection.

Forest fire alone, based on a recent survey inflicts an average of 25 million dollars worth of damage annually. Forest insects are currently threatening the complete destruction of nearly 100 million dollars worth of timber in Oregon and Colorado alone. Forest tree diseases likewise cause great damage, and can even wipe out entire species, as did the chestnut blight in the East. Currently, the white pine blister rust is one of the worst forest enemies.

In view of these facts, it is good news to all of us that the use of aerial photographs in the field of forest protection offers great promise of helping to reduce appreciably the damage done by these three major enemies of the forest—fire, insects, and diseases.

Uses of Aerial Photographs In Control of Forest Diseases

Thomas H. Harris

Assistant regional leader, Bureau of Entomology and Plant Quarantine, Berkeley, Calif.

The use in California of aerial photographs in the control of the white pine blister rust, illustrates what can be done with such photographs in the control of forest-tree diseases generally. Certain phases of the complex problem in blister rust control lend themselves admirably to the use of aerial pictures.

Aerial photographs taken on panchromatic film with a minus-blue filter on a scale of 1:20,000 are used in several phases of blister rust control work. In the search for rust infections during the early stage of spread they give clues as to how to enter unknown and often remote mountainous country and aid in the selection of favorable rust sites. They are used in planning control operations and the assignment of the eradication crews. Their primary use, however, is in the recognition and mapping of white pine stands preparatory to their selection for control treatment, a phase of control work called "white pine appraisal."

Four successive steps are taken by the field mapper when mapping and appraising sugar pine stands on cut-over land with the assistance of aerial photographs. These steps lead progressively to the concentration of attention on land sufficiently well stocked with sugar pine to warrant protection against the disease.

In the first step the mapper uses the pictures to orient himself in the field by recognizing ground features and land survey marks on the photographs, he can tell precisely where he is at almost any time. On cut-over land, on which most of the appraisal work is done, the photos become very detailed map substitutes. The mapper has little need, then, to run compass lines and to determine distances by pacing for the purpose of orientation and map making, a laborious and time consuming process.

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[1]Methods used by U.S.G.S. in mapping forested areas, by C. P. Van Camp, assistant Pacific Region engineer, U. S. Geological Survey.

Recent air survey development in British Columbia, by G. S. Andrews, assistant director of surveys and mapping and chief engineer, Department of Lands and Forests, British Columbia.

The Wernstedt-Mahan (PL-3) Plotter, by A. C. Hammon, Hammon, Jensen & Wallen.

The Multiplex Aero Projector, by K. B. Wood, Kendall B. Wood Forest Engineers.

The K.E.K. Plotter, by C. D. Jackson, U. S. Forest Service.

Discussion of plotting instruments, by H. C. Ryker, Harrison C. Ryker, Inc.

Film-filter-scale considerations in detailed inventory methods, by M. B. Savage, Rayonier, Inc.

Practical timber inventory techniques, by H. A. Jensen, Hammon, Jensen & Wallen.

Aerial photo sampling procedures, by R. C. Wilson, Pacific Northwest Forest and Range Exp. Sta.

How can photos aid future surveys?, by E. V. Roberts, California Forest and Range Exp. Sta.

Use of helicopter in Death Valley survey, by C. R. Lloyd, U. S. Geological Survey.

In step two, the mapper, by inspection of the aerial photographs, can eliminate at the very start the non-commercial timber areas, such as burned areas, cut-over land, brush fields, and meadows. Without the photographic aids he might spend much of his time in valueless areas.

In the third step, the mapper, narrowing the field of interest still further, identifies on the photographs those timber types in which sugar pine usually does not occur. This he does, however, with help from occasional ground checks. Carrying the photos in the field, the mapper can check homogeneous types at one point on the ground, and trace the type boundary on the photographs with confidence. In this way he can quickly delineate and eliminate them from consideration.

In the fourth and last step attention is concentrated on the timber types in which it appears probable some sugar pine is present. These types can usually be recognized in the pictures, but ground checks are needed for verification and to determine whether enough sugar pine is present to justify the cost of blister rust control. Once identified on the ground, type boundaries can often be traced on the photos for considerable distances without the need of tracing them further on the ground. The amount of ground work this procedure saves is large.

With the aid of aerial photographs a trained interpreter with a knowledge of blister rust control techniques can successfully eliminate extensive areas from costly ground sampling. The end result of the four steps is a series of aerial photographs on which sugar pine stands suitable for protection against white pine blister rust have been outlined. The boundaries of the stands are next transferred to planimetric base maps. Finally before protection of any stand is undertaken an economic study of the amount of sugar pine present is made to check the cost of protective treatment against the value of the pine crop.

The advantages of the use of aerial pictures are simplification and acceleration of the work, with consequent reduced cost and increased accuracy. Their continued use in planning blister rust control operations is a certainty; it is a use that is sure to expand in the future. No doubt as other forest-tree diseases become economically important, aerial photos will be similarly employed in their control.

Uses of Aerial Photographs In Control of Forest Fires

Keith Arnold

Assistant professor of forestry, University of California, Berkeley.

Recent developments in photogrammetry and in aerial photo interpretation go far beyond their present application in forest fire control. Though some fire control-men recognize these potentialities, few capitalize on them. These potential uses may be discussed under two headings—"complete intelligence" and "individual briefing."

Aerial photos as a complete intelligence source on going fires.—Skilled photo interpreters gain an intimate knowledge of the entire area in and surrounding a forest fire in a few minutes. This usually is done by stereoscopic study of 1/20,000 scale vertical aerial photographs which were taken long before the fire started, in conjunction with the federal mapping program. With a background of fire experience the photo interpreters can delineate topography and fuels in relation to rate of spread, intensity of burn, and difficulty of control. They can evaluate alternative control line locations, determine the best travel routes to the fire, and increase the security of men and machines by planning for safety zones and emergency exits. When this information is combined with the knowledge of present and anticipated weather conditions, aerial photos provide a complete basis for control strategy.

Aerial photos as an important adjunct to fire line briefing.—Men who serve as fireline overhead must lead other men and equipment to any given spot on the fire perimeter day and night. There, in addition to the direction of specific fireline actions they must be apprised of the over-all strategy, and be acutely aware of dangerous situations. Furthermore they must be able to transmit all such information to the man who will be responsible for that section of fire line during the next work period. Men unfamiliar with the country yet skilled in the use of aerial photos frequently have demonstrated more effective fireline action than men who knew the country well. This advantage arises because the availability of information from the aerial photos is not affected by smoke, heat, darkness, and other confusing elements associated with forest fires.

Training is the key to the use of aerial photos in forest fire control. Skilled interpreters use photos; others do not. From this conclusion three suggestions may be made: (1) self teaching or correspondence courses directed toward the application of photogrammetry to forest fire control should be provided field personnel; (2) field personnel should be encouraged, if not required, to use aerial photos until they can be read as easily as a contour map; and (3) fire control agencies should catalog skilled photo interpreters and establish machinery to channel them into intelligence jobs on large fires.

The present trend is toward a more important role for aerial photos in forest fire control. This trend stems from the fact that it is now feasible and practical to transport men greater distances to fight large fires. Though improvements in fire fighting techniques and transportation facilities have reduced the number of large fires, overhead are transported hundreds, even thousands of miles for fire planning and line construction supervision. These men often are fighting fires in country with soil, topography, and cover completely foreign to them. Since this trend appears to be continuing, the contributions aerial photos offer forest fire control become even more significant.

Uses of Aerial Photographs In Control of Forest Insects

J. F. Wear and J. W. Bongberg

Forester-pilot and entomologist, respectively, U. S. Bureau of Entomology and Plant Quarantine, Berkeley, Calif.

In order to develop and maintain an intelligent program for the control of harmful forest insects, surveys of the forest must be made periodically to determine current insect activities. Although aerial photographs are useful in several phases of insect control work, such as the briefing of field crews and the detailed planning of control operations, this discussion is limited to a consideration of their use in making forest insect surveys.

Ground methods for making such surveys have not always proved to be satisfactory. Adequate ground cover of large and often inaccessible areas on an annual basis is not possible with the limited time, manpower, and funds available each season. In recent years various kinds of aerial surveys have been used successfully to supplement, and in some cases to replace, ground surveys in covering large areas of forest land both rapidly and economically. In addition to speed and economy, aerial surveys frequently offer the advantages of greater ease of detection of insect-infested trees. This stems from the fact that the first symptoms of insect attack frequently are manifested by the tips of the tree crowns which, in dense coniferous stands, are much more easily seen from the air than from the ground.

The most widely used aerial survey method for forest insect detection on the West Coast today is of the general reconnaissance type. This method involves the sketch-mapping by an aerial observer (on a one-quarter-inch-to-the-mile scale map, or occasionally, on an aerial photographic mosaic) of forested areas that have been attacked by either defoliator or cambium-mining insects. In this manner the 49 million acres of forested land in Washington and Oregon are now being surveyed annually to locate epidemic infestations of the spruce bud worm.

By locating centers of insect outbreaks and delineating them from the air, it is possible to appraise the general distribution and damage intensity on a region-wide basis. Once the aerial reconnaissance survey has been made, ground crews can then be directed to localized areas to make accurate estimates through intensive examination and with a minimum expenditure of time and money. In directing ground crews to the infection centers, many of which may be in remote mountainous country, use of existing basic aerial photographic coverage of the area may be very helpful. Data obtained from ground and aerial surveys provide the necessary information for planning control programs in critical areas.

Current research seeks to determine means for the direct application of aerial photography to the bark-beetle problem in ponderosa pine and Douglas-fir stands in California and the Pacific northwest. Preliminary results indicate that aerial photographs taken with the proper film-filter-scale combination constitute a very useful means for detecting and appraising insect outbreaks. They perhaps show greatest promise for appraising damage on a tree-by-tree basis in localized areas where insect infestations are either suspected or known to exist.

A comparative study is currently being made in California of experimental vertical aerial photography flown in a test area of the east side ponderosa pine type. One purpose of the study is to determine the most suitable photographic scale and film-filter combination for appraising ponderosa pine loss due to bark beetles. Prior studies indicated that the amount of tree crown detail required for accurate interpretation of insect damage usually necessitates vertical scales of 1/10,000 or larger. In this test the photography, therefore, was flown at scales of 1/2,500, 1/5,000, and 1/7 500 using panchromatic, infrared and color films in conjunction with a variety of filters.

Scale.—Results of this test show that, regardless of film and filter, the larger the photographic scale the more detailed and accurate is the interpretation of insect damage to tree crowns. For example many spiked-topped trees (old insect kills) can be seen on 1/2,500 scale photography that are not discernible at the smaller scales, with the result that such trees might be interpreted as being completely healthy when studied only on the small scale photography.

However, there is at least one possible exception to this statement regarding the merits of large scale photography. Very tall trees exhibit excessive stereoscopic parallax on large scale vertical photographs having the conventional 60 percent overlap. There is a consequent difficulty of simultaneously viewing the entire length of a tree crown stereoscopically and therefore of determining the presence or absence of insect attack.

There are other scale considerations also when using aerial photographs on insect surveys. The larger the photographic scale used in covering a sizable area, the more prints must be processed and interpreted; the more tie-ins must be made with adjoining prints; and the more time-consuming the map compilation. Assuming that a fixed amount of money is available for making a forest insect survey, the choice of scale may depend upon whether a fair degree of accuracy is wanted in the photographic interpretation of 100 percent of the area (in which case a small scale would be used), or a higher order of accuracy is preferred on a few photographic sample plots in the area (in which case larger scale photography is required).

Film.—Results of this experiment and similar tests conducted in the Pacific Northwest indicate that panchromatic film provides better tone contrast and resolution of detail than infrared film for detecting insect-infested trees. Color photography presents good color contrast between the sorrel foliage of infested trees and green foliage, but the slow emulsion speed of color film, and the bright ground reflections from certain light-colored soil do not favor

sharp definition of tree form and crown detail. Tests in the Pacific Northwest showed that color photography does not show marked advantages over panchromatic photography for distinguishing insect-induced tree mortality in Douglas-fir stands. Its usefulness in the California test appears to be somewhat greater, although insufficient study has as yet been made to merit final judgment.

Filter. — On black and white photography different filters will either increase or decrease appreciably the contrast between insect-infested trees and their surroundings. Of the filters tested in the Pacific Northwest, the A-25 appeared to be the most effective in distinguishing bark beetle loss, while the G and K-1 filters gave excellent results in the California test.

Regardless of the scale, film, and filters used, insect damage can be appraised on aerial photographs more easily in open stands than in dense stands. Penetration of shadows for ground detail in dense stands is very difficult with only a very small proportion of the down trees being visible.

As indicated above, we have only begun to explore the possibilities for making advantageous use of aerial photographs in the control of forest insects. Such evidence as has been obtained to date, however, indicates that aerial photographs are destined to play an increasingly important role, both in the making of forest insect surveys and in the subsequent planning and execution of control measures.

Effect of Fertilizer on Planted Pine

Evidence that fertilizing young pine trees at the time of planting may not result in benefits is available from a study of applications of various fertilizers to a plantation of jack pine in central Missouri. In the spring of 1949 1-0 stock was planted in an abandoned field in the Ashland Wildlife Area of the University of Missouri. The soil was a silty clay of loessial origin. The fertilizers used, with amounts on a per-acre basis, were: 2 tons lime, 300 pounds ammonium nitrate, 200 pounds 0-20-20 (N-P-K-), and 500 pounds rock phosphate.

The six treatments chosen for test were as follows: (1) no fertilizer, (2) lime, nitrate, 0-20-20, and rock phosphate, (3) same as (2) minus lime, (4) same as (2) minus nitrate, (5) same as (2) minus 0-20-20, (6) same as (2) minus rock phosphate. The fertilizer was applied broadcast to the soil surface at the time of planting. The experiment consisted of a block of twenty plots—five unfertilized plots and three each of the five fertilizer treatments. There were 144 trees in each plot, spacing 5 feet by 5 feet.

After two seasons' growth a tally was made of survival and height. The average survival percentages for the treatments, arranged in descending order, are given below.

Treatment	Survival percentages
(1) no fertilizer	88
(4) Ca, P, K, rock P	80
(5) Ca, N, rock P	58
(2) Ca, N, P, K, rock P	37
(6) Ca, N, P, K	33
(3) N, P, K, rock P	30

It is notable that the plots receiving nitrogen had low survival percentages compared with unfertilized plots and with plots fertilized but without nitrogen. The cause of the high mortality on plots receiving nitrogen was apparent in field inspections. A dense growth of tall weeds grew on these plots during both growing seasons, the weeds being especially rank during the first growing season. Many pine seedlings were overtopped and died, presumably from lack of moisture, sunlight, or both. Weed growth on the plots receiving no nitrogen was rather sparse.

The data also indicated that the presence of the potassium and phosphorus in the 0-20-20 fertilizer adversely affected survival. It seems likely that the phosphorus helped the growth of the weeds more than it did the pine.

The fertilizer did not produce a significant increase in height growth of surviving seedlings. The average height of unfertilized trees was 1.04 feet compared with 1.05 feet for fertilized trees.

Results obtained in this experiment were similar to those obtained by Holsoe[1] with planted red pine. He found that 4-12-4 fertilizer, placed 6 inches under the surface at the time of planting, stimulated weed growth, which reduced the survival percentage of the pine.

Additional information on the effect of fertilizer on planted jack pine was obtained from the Weldon Springs Experimental Forest in eastern Missouri. Plots were fertilized with lime alone, rock phosphate alone, and lime and phosphate together. Unfertilized plots had slightly higher average survival than did fertilized plots. No difference in average height growth was observed between fertilized and unfertilized trees.

It may be concluded from these and other similar experiments that intolerant trees which do not require fertile soils, such as many species of pine, may suffer appreciable mortality from weed competition if fertilized during the year of planting. Furthermore, the fertilizer is not likely to stimulate height growth of surviving trees.

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[1]Holsoe, Torkel. Fertilizing planting stock on eroded soils. Jour. Forestry 39:69-70. 1941.

Range Management History and Philosophy[1]

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RANGE LAND MANAGEMENT has come a long way from the widespread unrestricted grazing in the days of western settlement. Early public land policy tended to encourage such grazing. Insufficient area allowed in individual homesteads, the hope of many settlers to make a stake and return to their former homes, economic pressures, and the necessity of grazing ranges closely to discourage others from settling or remaining, all played a part. Such philosophy and the failure to appreciate that overgrazing was damaging, seriously deteriorated most western ranges, and left in their wake bankruptcy, blasted hopes, deserted homes, and distressed communities.

Fortunately, in the 50 years while the Society of American Foresters has been growing to its present stature, range management philosophy has evolved to where conservation is more generally emphasized. Most federal range lands have been brought under administration. Private owners now have a greater appreciation of the benefits which can accrue to them and the public generally from efficient management of their ranges. Improved practices, developed by research, have already brought millions of dollars in savings and increased revenue to stockmen annually. Such progress might indicate that range conservation had already attained a high degree of success. However, the condition of western ranges was so bad 50 years ago, and there was such a lack of understanding of efficient range management, that major progress has been attained only within recent years.

Native forage-producing lands, commonly called range, approximate 950 million acres, about half the total land area of the nation. About two-thirds are in private ownership and one-third public. Three-fourths of these ranges are in the West. Nearly two hundred million acres are grazed forest lands and coastal prairies of the South. With abundant rainfall and a heavy cover of turf-forming grasses, southern ranges have not generally been seriously damaged, although the productivity of some has been lowered by promiscuous burning.

It is appropriate that we review some of the milestones in the development of range management philosophy in its relation to land use management.

Early Public Land Policy

The federal land policy resulted in the passing to private ownership of some 375 million acres of range lands, but it was not well adapted to encourage range management.

The original 160-acre homestead law and the forest homestead law were designed primarily for farming. In areas submarginal for farming they ordinarily provided so small an acreage of low-value range land that it was impossible for the settler to make a satisfactory living on the area homesteaded. Most settlers had little appreciation of the true productive capacity of the range. Where irrigation water was not available or not later developed, cropping ordinarily proved a failure. Uncropped portions were commonly abusively grazed. Many such homesteads were abandoned in periods of depression, drought, and hard winters. Ultimately, most of these have been acquired by stockmen and are now used in connection with their other private holdings. They offered the opportunity for establishing home ranches which served as bases for grazing public lands and for control of water holes and other strategic areas. Some have been reacquired by the federal government, or occasionally the states, and incorporated in public reservations. Where they have remained as isolated public domain tracts or as tax-delinquent lands, they have often continued to be abused.

A large part of the dry farm area of the West was developed through the application of the enlarged homestead acts. Thousands of established ranches, using public land in their operation, were broken up and forced out of business or seriously hampered in management, sometimes for years. Some 15 to 25 million acres, submarginal for cultivation, were plowed and later abandoned. The most depleted areas in the Plains States and in some foothill areas of the West are these plowed and abandoned "dry farm" fields. Some were a part of the famous Dust Bowl. Many are still producing only from 1 to 10 percent of the forage they once produced. It has taken years for other areas to reach a semblance of their original forage production.

The 640-acre grazing homestead act did facilitate passing of large acreages of range into ultimate stable private ownership. This did not take place, however, until the operation of thousands of additional established ranches were seriously disrupted and tens of thousands of hopeful settlers practically destroyed the forage resource on their homesteads and lost most, if not all, of their savings. Many stockmen were forced to overextend their investments in lands in order to remain in business. This in turn, led to heavy stocking in the hope of meeting burdensome financial obligations.

The railroad and wagon road grants gave about 100 million acres of alternate sections from 10 to 40 miles on each side of the rights of way to encourage their construction. Some stockmen, leasing or buying such lands or utilizing scrip given in lieu of some of them, gained control of large tracts. Where such lands were reasonably productive, range

[1]Paper presented at a meeting of the Division of Range Management, Society of American Foresters, Washington, D. C. December 15, 1950.

management was facilitated. In a few areas, individuals or associations leased these private lands and gained control over intermingled public lands. This made possible improved management. As one prominent sheepman commented, however, many went broke after World War I trying to buy such lands. Where such a condition prevailed, too heavy grazing often resulted, to be followed by extreme deterioration when drought occurred.

Some stockmen endeavored to control large areas of unappropriated and unreserved federal lands by fencing, without legal authority. Most applied a better type of management on these controlled ranges than was possible under the generally prevailing severe grazing competition for federal lands. Often the controlling stockmen tried to discourage settlers on "their domain" through excessive grazing in the vicinity of new homesteaders. The Department of the Interior tried in some degree to overcome such illegal fencing, but this ordinarily only intensified extension of excessive grazing.

Foundations of Conservation

The establishment of several forest reserves before the turn of the century brought a recognition of damage to timber reproduction and watersheds from excessive grazing. A regulation was issued to exclude grazing from such forests, but the regulation was never applied. Dr. F. V. Coville, chief of the Division of Botany of the Department of Agriculture, was called upon by the Department of the Interior, which controlled the forest reserves, to study the problem of sheep grazing in the Cascade Forest Reserve of Oregon. He concluded that the evil effects of abusive sheep grazing could be overcome through regulation and management. Shortly after that, at the request of the Public Lands Commission, Dr Coville and A. F. Potter, a stockman of Arizona, made an exploratory survey of the condition of the public lands generally and recommended their regulation by the federal government, both to conserve the resource and to give greater stability to users.

When the forest reserves were transferred to the Department of Agriculture in 1905 and the Forest Service was established, the forest and range resources were recognized as crops, and an effort was made to manage the range rather than to exclude grazing. The increasing flood damage, injury to timber reproduction, and other adverse effects of unsound grazing played their part in the great expansion of the national forests in the western mountains during the next two years.

Some major adjustments in grazing use of the national forests were made between that time and 1915, only to be undone by overgrazing resulting from increased numbers of livestock during World War I in a fruitless effort to produce more meat. Since World War I, the national-forest range program has aimed to restore deteriorated ranges and provide a sustained forage supply and improved watershed cover on the 80 million acres of range land within the national forests. Preference is given to resident home builders in allocating grazing privileges to aid them in building up economical agricultural enterprises capable of satisfactorily supporting families. By correlating and managing the national-forest range with adjacent range and crop lands, stockmen are better able to round out efficient yearlong operations and maintain them on a more permanent and profitable basis.

Range Research

The key to maintenance of the range, with all its direct and indirect social and economic benefits, is the restoration and correct use of the range forage and the soil on which it grows. The premise upon which public and private range programs are built is the development of basic principles and practices of better management.

Many early research workers were discouraged with their results because of the low productivity of the land and their inability to convert such lands to high-producing improved pastures. A few recognized that range problems were quite distinct from those relating to humid improved pastures.

With the desire to bring about more efficient use of the national-forest ranges, Pinchot, Potter, and Coville planned for range studies which would facilitate efficient grazing administration of the forests. Dr. James T. Jardine, later director of research in the Department of Agriculture, and Dr. A. W. Sampson, later professor of range management at the University of California, were hired to initiate such studies. Others were employed shortly thereafter, and in 1910 the Office of Grazing Studies was formed in the Forest Service, with Dr. Jardine in charge. His dynamic personality, keen vision, and directive capacity stimulated the studies, and remarkable progress was made in developing many empirical results applicable to mountain ranges. The Great Basin Experiment Station in the mountains of central Utah was established in 1912 to facilitate more intensive studies and to lay a fundamental foundation for range management. Dr. Sampson, the first chief of that experiment station, pressed forward vigorously with a group of ecological studies to meet this purpose.

In 1915 the Santa Rita and Jornada Range Reserves in southern Arizona and New Mexico, established in 1903 and 1912, respectively, were transferred from the Bureau of Plant Industry to the Forest Service, along with authority for range research on other public and private lands as well as the national forests. The McSweeney-McNary Forest Research Act of 1928 set up an authorization which gave impetus to expansion of range research, both on forested and untimbered ranges, public and private. Considerable expansion has taken place in the range research program since the mid-thirties. At the present time studies are under way in the Great Plains area, the desert and foothill areas of the intermountain and southwestern regions, the foothills of

California, and many mountain areas. In 1940 studies of grazing of forest range were initiated in eastern North Carolina and southern Georgia. This was followed in 1944 with somewhat comparable studies in central Louisiana. Provision has since been made for range research in several other southern states, including Missouri. The program of establishing experimental forests and ranges followed by Congress since World War II has been a big factor in recent expansion.

Range research is now under way in all six regional forest and range experiment stations in the West and at the Central States, Southern, and Southeastern stations. Much of our work is cooperative with other federal agencies and with state agricultural experiment stations. Such cooperation has not only broadened the studies but has facilitated an integrated attack dealing both with the animal and range forage problems.

These studies have developed many practices as aids in management and more efficient conservation of the range resources. Numerous practices are now so widely applied that few persons realize that they came from research. These include: (1) opening and closing dates which harmonize better with readiness of the range for grazing and nutritional requirements of livestock; (2) a fairly good basis for determining grazing capacities of western range types; (3) a basis for judging productive condition and whether the forage cover and soil are improving or deteriorating; (4) deferred and rotation grazing which permit satisfactory use of the forage by delaying grazing until after seed dissemination or forage maturity on a different portion of the range each year; (5) improved methods of grazing sheep and goats, such as open and quiet herding and bedding them down in a new place every night to avoid damage through trampling and localized overgrazing; (6) obtaining a better distribution of cattle through well-placed watering facilities and better salting methods to bring about more and efficient use of all the range forage; (7) management which harmonizes grazing with forest requirements and overcomes the damage to timber reproduction which once prevailed; and (8) management which better harmonizes grazing with other range resource values.

More fundamental studies have been conducted to determine the interrelationship between soils and forage production, the resistance of important species to grazing and the development of utilization standards, the ability of plants to obtain and produce the necessary growth substances, and the relationship of changing nutritive values of plants to the nutrition of the livestock. Numerous examples could be cited of increased forage and livestock production obtained from improved management developed by such research. In general, research has brought about better condition of range and animals, greater calf and lamb crops, more rapid gains, lower death losses, and increased profits to producers.

In range reseeding the objective has been somewhat different on western ranges and those in the South. In the West the principal aim has been to develop methods and find suitable plants for seeding on the portion of range lands now so badly depleted that reasonably rapid natural revegetation appears improbable. Although some progress was made in the early studies, especially for reseeding mountain meadows which had especially favorable soil and moisture conditions, costs were relatively high. The present wide-scale application of range reseeding is primarily a development of the last 15 to 20 years. Intensive studies were first undertaken in the intermountain and northern plains regions. Such studies were extended to other parts of the West and to the South in 1945. In the South the objective has primarily been to replace a heavy cover of low-value native range plants with more palatable and nutritious plants that would extend the grazing season and afford better development of grazing animals.

More than 8 million acres have now been successfully reseeded by stockmen and governmental agencies throughout many parts of the West. Many of these reseeded areas have increased forage production from 5 to 10 times, some 15 to 20. The gross value of livestock produced annually in recent years on these reseeded ranges has often been from $10 to as much as $25 an acre.

Although the problems of noxious range plants was early recognized, successful procedures for controlling them were generally limited to grubbing or other control of several highly poisonous plants. In studying methods for reducing competition to facilitate range reseeding, economic procedures have now been developed for converting many low-value big sagebrush areas to productive grassland range. Methods for reducing other undesirable shrubs are now evolving, both in the South and in the West. There are millions of acres covered by low-value juniper, mesquite, and unwanted hardwoods. Chemical control has been a recent development for reduction of shrub stands at relatively low cost. Fire, which was used extensively in an unrestricted manner with terrific losses at times to both forage and other land resources, has now been found to offer some potentialities for converting low-value shrub stands to productive range. This is true on the more level areas of big sagebrush range, where other land values than forage are not important. Recent studies of shrub conversion in California indicate potentialities for using fire in this process when soils are reasonably favorable and species to reseed and successful establishment methods are known.

Such research evolved over the years has now laid a much better foundation for range management generally than prevailed 50 years ago, or even 30 years ago.

Broadening Federal Policy

When John T. Caine III, a western trained man, became exten-

sion animal husbandman about the time of World War I, it appeared that real progress might be made in disseminating information concerning better range management and other ranch practices. However, he soon left the Extension Service, and range extension on a national scale has seriously lagged.

Throughout much of the 1920's consideration of grazing regulation of the unreserved and unappropriated public domain continued. The Taylor Grazing Act was finally enacted in 1934, and the possibility of overcoming excessive overgrazing and applying better management became a reality not only on the federal lands incorporated in the grazing districts but on many interrelated private lands. The objectives of administration of these federal grazing lands are somewhat similar to those of the national forests. Grazing privileges are allotted to established owners of ranch land who have much more voice in administration of the grazing districts.

In the mid-1930's the Soil Erosion Service was established in the Department of the Interior to aid erosion control on both public lands under the administration of the Interior Department and on private range lands. When this service was transferred to the Department of Agriculture a few years later, its responsibilities were expanded. The land utilization projects now administered by it were taken over from the successor to the Resettlement Administration. These lands, often submarginal for cultivated agriculture, had been purchased by the federal government and organized into units in cooperation with stockmen for more efficient grazing use and support of the maximum number of families. The widespread development of soil conservation districts and the development of supplemental soil demonstration areas has served as one of the more important means for bringing home to private owners the potentialities of improved range management. Technicians cooperate with the private owners in developing ranch plans which include management of the range land.

The range conservation program of the Production and Marketing Administration inaugurated in 1936 has proved an important step in the interest of better managed, more productive private range lands. Encouragement in carrying out the range management objectives is offered in the form of benefit payments. Such payments are conditioned upon the adoption of the betterment practices.

Several other federal programs have stimulated better range management. Among these the improvement in livestock, in which the Bureau of Animal Industry has played a major part, has encouraged shorter grazing seasons, more conservative grazing, and other desirable range and livestock management. The plant introduction and improvement work of the Bureau of Plant Industry, Soils and Agricultural Engineering has aided reseeding studies, as has the seed production and other nursery phases of the Soil Conservation Service. Close cooperation is maintained among these agencies. The Farm Credit Administration has relieved much of the financial stress that seemed to discourage better management. Still others could be cited.

State Programs

State agricultural colleges and experiment stations have become more and more interested in the range problem. Limited studies were initiated about the turn of the century. In recent years most state stations have undertaken phases of range research, often in cooperation with the Forest Service and other federal bureaus.

Much could be said about training range men in state colleges and universities for federal and state work, and for handling of ranches.

The state extension services have disseminated information concerning better range management. Research results and principles are presented in a practical form to owners, users, and managers of range land, and test demonstrations of desirable practices adapted to local conditions are conducted. This program is largely carried out by county agents and state extension specialists working in cooperation with stockmen. Only two state range extension specialists have been designated, but extension agronomists, extension animal husbandmen, and extension foresters have given more or less attention to the range problem. Many range management principles are not yet widely known. An increase in the extension personnel trained in range management would immeasurably broaden the possibilities of better management of the range.

Changing Stockman Philosophy

A growing understanding of range management principles and practices by ranchers has resulted in many taking an active part in the development of various state and federal programs and in more efficient use of their range lands. In the early days most stockmen were concerned primarily with establishing a home. Returns were ordinarily low, and life was hard. Many, too, looked upon the effort of the government to help as an infringement on their freedom. Over the years, more and more stockmen have become interested in the extension demonstrations and a great many are visiting experimental ranges to observe results, and are reading research reports and endeavoring to apply the results. Many college graduates are going into the livestock business. This is tending to give an entirely different attitude toward better management, both on the part of such graduates and other stockmen. Many of these graduates are trained in animal husbandry which causes them to recognize that better animals require better nutrition.

Generally, it is the larger, more progressive stockmen who have taken the lead in range management. Many have become real students of range problems. There are still a great number of small outfits, however, inadequate to provide a satisfactory living. The owners of these must earn much of their living from other activities. They often give little, if any, care to their animals while on the range.

Few of these people realize the responsibility which they have for sound use of the land they own or use. The several federal and state programs which have come in direct contact with stockmen and the gradual spread of knowledge of better management and the practical demonstrations which individuals have developed lead to the hope that more and more of these stockmen will follow the lead of their more progressive neighbors. Higher profits in recent years, especially when better management has been applied, have greatly helped to change stockmen's philosophy. The recent development of management organizations and increasing numbers of range consultants indicate that stockmen, who can afford such help, are looking toward still better management of their holdings.

What of the Future

The remarkable production of meat and other animal products during World War II on western range lands in coordination with other agricultural production, considerably above that of World War I, attests the value of development and application of sound range management philosophy. Beef and veal production in the nation as a whole has been greater in every year since 1941 than in any previous year. Similarly, lamb and mutton production in each year from 1941 to 1946 inclusive exceeded that of any previous year.

There is still, however, a vast area of deteriorated range, often adversely affecting watershed management. Overgrazing continues on too many range areas. Corn belt woodlots are continuing to be damaged by excessive grazing with little return either from timber or livestock. Low livestock production from many extensive areas, particularly in the South, brings home the need for still more efficient management there. All of these emphasize the need for additional research, both of a fundamental character that will answer many problems confronting stockmen and land administrators and of a practical character that will show the economic and other values which flow from actual application of better management.

Although there has been a greater recognition of the need for better range land administration by federal and state agencies, much remains to be done if public range lands are to produce the forage, meat, wool, and other animal products of which they are capable. More and more stockmen must recognize their responsibility for sustained production and better management of the lands they own and use. Greater mutual understanding of problems and possibilities for betterment offers still further opportunity for improving range lands and increasing efficiency in their utilization in a greater and more profitable livestock production.

Relationship Between Shear and Diagonal Web Stresses in Laterally Loaded Wood Panels[1]

Twenty-four diagonally-sheathed, quarter-scale panels constructed of Douglas-fir members approximately one-sixteenth the cross-sectional size of standard finished material were tested under lateral loading. The experiment was designed to determine the accuracy of a proposed method of analysis of stresses in wood panels and diaphragms. This proposed method, which was evolved from consideration of the mechanics of webs of shear resistant beams, is explained, and its application to panel and diaphragm design is indicated. Test panels of four different height to length ratios, three different nailing patterns, and two different spacings of stud members were prepared.

Results, including statistical analyses, of preliminary direct withdrawal and lateral resistance tests on nails of the the two sizes used in panel construction are tabulated in the appendix. Deflections of the panels at various load increments were taken at intervals along the loaded and unloaded end posts and across the top plate. Lateral loads divided by panel lengths provide a measure of shear stresses. Shear stresses and the deflections of the panels at the centers of the end posts substituted in the conventional uniformly-loaded simple beam formula are used to calculate diagonal web stresses. The relationships between shear stress and diagonal stress for the various panel designs are shown by "rigidity index" curves. The influences of panel design variables as indicated by the rigidity index curves are discussed.

It is concluded that: (1) quarter-scale panels with a height-length ratio of 1:1 are less rigid than quarter-scale panels with height-length ratios of 1:1.5, 1:2, and 1:3; (2) quarter-scale panels with height-length ratios of 1:1.5, 1:2, and 1:3 have approximately the same rigidity; (3) panels with two and with three nails per joint are considerably more rigid than panels with only one nail per joint; (4) quarter-scale panels with three nails per joint are slightly more rigid than panels with two nails per joint (greater rigidity occurs only at lower unit shear loads and is not enough to justify the use of three nails per joint in construction); (5) the spacing of studs four inches apart in a quarter-scale panel gives the panel much more rigidity than does a stud spacing of six inches; (6) the relationships between shear and diagonal web stresses found through this investigation are in accord with the relationships expected; and (7) additional tests on panels of other designs are recommended.

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[1]Abstract of thesis for M.S. degree in forestry.

An Approach to Watershed Protection Criteria

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BETTER WATERSHED PROTECTION criteria have long been needed for the mountain lands in the upper drainage basins of the Boise, Payette, and Salmon Rivers in south-central Idaho. Here is an extensive area of very steep slopes covered by a coarse-textured soil derived from granite. This soil has little cohesiveness. It is therefore susceptible to local displacement during logging operations and by livestock trampling. It is also vulnerable to erosion by raindrop impact and by overland flow. Storm runoff and erosion are especially serious during cloudburst type summer rains, when it is not uncommon for rainfall rates to exceed 3 inches per hour for brief periods.

A watershed survey (*8*) and sediment measurements (*6*) revealed the most seriously eroding portion of these lands to be overgrazed and burned grassland ranges on foothill slopes above the irrigated valleys and below the timbered headwaters. Infiltrometer tests in this zone (*1*) also showed that undeteriorated sites with the perennial bluebunch wheatgrass (*Agropyron inerme*), were more effective in preventing storm runoff and erosion than sites which had been invaded by the annual cheatgrass brome (*Bromus tectorum*). Although these investigations indicated a need for more plant cover and less soil disturbance, they did not define the specific plant cover and soil conditions that are required for minimizing overland flow and erosion.

A new study was initiated in 1947 to explore the possibility of developing management criteria for effective protection on the wheatgrass and cheatgrass lands. One objective was to determine which of the measurable site characteristics of slope steepness, soil depth, total ground cover, plant cover, erosion pavement, total soil pore space, noncapillary soil pore space, root abundance, and size of maximum bare openings between plants dominantly control overland flow and erosion. A second objective was to determine the extent to which the dominant site characteristics may be altered without losing their effectiveness for watershed protection purposes.

Plan of Study

The study was planned to test the proposition that if sites were subjected to artificial rainfall comparable to that expected in major storms, variations within any of the controlling site characteristics should be reflected by significant differences in amounts of overland flow and erosion. It was further reasoned that any range of values over which the controlling site characteristics could be altered without resulting in substantial increases of overland flow or soil erosion above the minimum might be considered to provide the necessary requirements for watershed protection.

To test these propositions, a 6- by 6-foot plot was established on each of 14 wheatgrass and 16 cheatgrass sites within a 200-acre fenced portion of the Boise River watershed. This area had not been grazed for 17 years, so that current grazing disturbance was eliminated as a variable in the study. Within the area, however, it was possible to select plots having a wide range of conditions with respect to nine site characteritics as follows:

Slope gradient.—The slope of the test plots ranged from 33 to 66 percent.

Soil depth.—Half of the plots in each cover type were located on soil less than 24 inches deep to bedrock; the other half on deeper soil. Plots in each of the two general soil depth classes were selected to include a representative cross section of plant cover and ground cover densities.

Ground cover density. — The plots were selected so as to include a range of ground cover density (plant basal area plus surface litter) of from less than 10 to more than 90 percent. Density was determined by square-foot-density estimates (*10*) and expressed as percent of total plot area. These estimates were checked by 100 mechanically spaced point observations with a point analyzer (*5*).

Plant cover density.—Plant cover density (the area of aerial herbage projected on the ground) ranged from about 8 percent to about 61 percent. These values also were determined by square-foot-density estimates, checked by point analyzer, and expressed as percent of total plot area.

Plant cover generally formed a second story over litter on the ground and extended only slightly over bare soil. To separate the net effects of plant cover and ground cover, the aerial herbage was removed to a height of ½ inch above ground on half of the plots in each cover type prior to the application of rainfall. The clipped plots were selected from comparable pairs of plots throughout the range of plant cover density.

Erosion pavement.—About 20 percent of the soil in this area is made up of particles greater than 5 millimeters in diameter. These coarser particles tend to form an erosion pavement at the soil surface, especially on bare areas. The amount of erosion pavement on test plots was determined by square-foot-density estimates and point analyzer observations, and was found to vary from no erosion pavement to as much as 47 percent.

Total soil pore space.—Average total pore space on each plot was determined from quadruplicate volume-weight soil samples within the zone of rainfall penetration. The average total pore space on a volume basis (*7*) ranged from about 28 percent to about 57 percent, although all but two plots had pore space values greater than 35 percent.

Noncapillary soil pore space.—Average noncapillary pore space was also determined for each plot from the volume-weight samples.

TABLE 1.—OVERLAND FLOW, SOIL EROSION, AND SITE CHARACTERISTICS ON TEST PLOTS SUBJECTED TO 1.80 INCHES OF CONSTANT RATE ARTIFICIAL RAINFALL

Range types	Overland flow	Soil eroded	Ground cover density	Maximum bare openings	Plant cover density	Erosion pavement	Root abundance	Soil pore space		Soil depth	Slope gradient
								Total	Noncapillary		
	Percent	*Pounds per acre*	*Percent*	*Inches*	*Percent*	*Percent*	*Percent*	*Percent*		*Inches*	*Percent*
	0.00	000	95.8	0	58.3	0.0	100	48.1	24.2	48	40
	2.36	104	94.4	2	00.0	1.4	95	57.4	21.7	48	53
	9.25	460	80.5	3	41.7	2.8	90	49.8	21.0	48	63
	9.71	804	29.1	2	00.0	34.7	55	41.2	26.6	30	51
	10.76	1,325	47.2	15	36.1	22.2	85	40.0	23.9	12	59
	12.91	970	16.7	4	11.1	47.2	45	34.2	21.6	25	59
Wheatgrass	14.51	1,476	30.6	10	00.0	36.1	85	46.6	31.1	6	60
	18.11	1,586	31.2	16	26.4	23.6	50	40.4	28.0	36	52
	18.97	1,520	30.5	12	00.0	34.7	70	48.8	25.5	7	61
	22.12	3,358	10.4	38	8.3	31.2	45	43.8	30.1	8	33
	22.45	1,983	16.6	14	00.0	33.3	60	41.1	24.5	9	48
	23.78	2,564	27.8	38	27.8	36.1	60	42.2	28.3	9	63
	24.45	2,103	18.1	25	13.9	20.8	60	41.5	19.3	8	37
	27.76	1,332	22.2	6	00.0	38.9	55	38.8	20.0	26	60
	3.91	625	86.2	5	00.0	2.7	70	39.9	23.6	46	53
	4.49	462	86.2	4	52.8	2.1	65	28.4	9.4	36	57
	5.40	669	91.7	5	55.6	2.1	70	45.9	27.2	40	45
	8.13	1,429	80.5	15	00.0	5.6	65	35.9	17.3	40	53
	15.37	2,410	27.8	31	00.0	29.2	40	44.5	27.8	8	43
	15.70	955	26.4	4	19.4	27.7	50	42.7	25.7	6	41
	18.88	1,388	23.6	7	11.1	38.9	45	37.9	18.2	24	59
Cheatgrass	19.00	1,171	26.4	6	11.1	41.6	70	38.0	19.0	24	60
	19.26	1,349	27.1	10	13.9	22.2	60	41.8	28.3	6	40
	19.67	1,926	26.4	23	00.0	32.0	50	48.8	33.7	4	44
	20.95	1,369	25.0	9	00.0	38.9	50	35.6	20.0	17	62
	26.39	1,939	20.8	19	9.0	31.9	20	39.9	20.4	9	43
	30.33	1,720	25.0	12	00.0	40.3	45	36.7	21.0	15	66
	31.04	2,555	19.4	29	00.0	33.3	40	46.6	26.9	7	45
	32.21	2,148	20.1	24	11.8	31.6	40	40.0	14.2	10	39
	41.73	3,620	13.9	49	00.0	36.1	35	39.4	15.0	6	48

These pore space values varied from about 9 to 34 percent, although all but one plot had values greater than 14 percent.

Root abundance.—A trench was dug through each plot after infiltrometer tests had been made. From 100 to 200 point analyzer observations of roots were made on the exposed profile along a line about 6 inches below the soil surface. Root abundance was expressed as percentage of total point analyzer hits occurring on roots. These values ranged from 20 to 100 percent.

Maximum bare openings.—Previous observations as well as preliminary tests revealed that much of the surface soil, particularly the coarser particles, was displaced by raindrop splash. This splash action was effective in moving particles over distances up to about 2 feet. The amount of splash action and the distance over which soil particles are moved appeared to be influenced by the size of bare soil openings to a greater extent than by the total bare soil area. Accordingly, measurements were made of the length of the largest bare soil opening along the lower boundary of each plot. These values ranged from 0 to 49 inches.

Additional measurements of maximum bare soil openings and of ground cover density were obtained along a 6-foot transect on 200 wheatgrass and 200 cheatgrass sites within the study area to determine how these two characteristics occurred together on the range. These transects were selected so that in both of the plant cover types 50 were located within each of the following ground cover density classes: 30 to 40 percent, 50 to 60 percent, 70 to 80 percent, and 90 to 100 percent.

Each test plot was subjected to 1.80 inches of artificial rainfall at a rate of 3.60 inches per hour by means of a modified Type F infiltrometer. This amount and rate of rainfall, although not the greatest of record, is believed to be reasonably representative of the worst summer storm conditions to be expected on these areas at least once every few years. Resultant amounts of overland flow and eroded soil were calculated from samples taken at 2- to 3-minute intervals. These amounts of runoff and eroded soil were then related statistically to the values of the eight site characteristics measured on each plot.

Overland Flow and Erosion

Overland flow from the wheatgrass sites varied from zero to nearly 28 percent of the applied rainfall. Eroded soil ranged from zero to 2,358 pounds per acre. The cheatgrass sites produced from 4 to 42 percent overland flow and from 462 to 3,620 pounds of eroded soil per acre (Table 1).

These amounts of runoff and eroded soil are, with one exception, very similar to those which were obtained in the earlier infiltrometer study of these two types (*1*). In the earlier study, none of the wheatgrass plots yielded any appreciable amount of runoff or eroded material. The uniformly effective behavior of the wheatgrass plots in that study is believed to have resulted from a relatively dense mantle of plants and litter, whereas the plots used in the present study included a wide

range of plant and ground cover conditions.

Dominant Site Characteristics

Simple linear regressions between each of the measured site characteristics and amounts of overland flow and soil erosion brought out that, in both cover types, ground cover density was the single characteristic most highly related to overland flow and maximum bare opening was that most highly related to soil erosion. A "t" test of net regression coefficients showed that on the wheatgrass sites, root abundance, soil depth, and maximum bare opening were also significantly related to overland flow while ground cover density and soil depth were related to erosion. On the cheatgrass sites, other characteristics significantly related to overland flow were erosion pavement, soil depth, root abundance, and maximum bare opening and those related to erosion were ground cover density, root abundance, and soil depth.

Aerial plant cover density had no significant effect on overland flow or erosion. This is believed to be due to the presence of an understory of litter at the ground surface. This covering of litter was about as effective in controlling overland flow and erosion on the clipped plots as was the litter and plant cover on the unclipped plots. Further tests on range where consistently close grazing has prevented the accumulation of much litter may show aerial herbage to be more important than was found in the present study.

Total soil pore space and noncapillary pore space showed no definite relation to runoff and erosion, probably because most of the measured pore space values were above the maximum value having a restrictive effect on infiltration and percolation. It is planned to extend the present study to grazed range where the soil is subjected to some degree of compaction by trampling. These further tests may reveal soil pore space to be more significant.

Slope gradient had no significant effect, possibly because of the shortness of the plots. It was observed that most of the overland flow from the plots occurred as sheet flow, there being no noticeable concentration of runoff or rilling. Tests on longer slopes, where there would be a greater opportunity for overland flow to become concentrated may show that slope gradient is more important than it was found to be in this study.

TABLE 2.—COMPARISON OF MULTIPLE LINEAR AND CURVILINEAR REGRESSION OF GROUND COVER DENSITY AND MAXIMUM BARE SOIL OPENING WITH OVERLAND FLOW AND SOIL EROSION

	Plant cover	Multiple correlation coefficient: Linear	Multiple correlation coefficient: Curvilinear index	Standard error of estimate: Linear	Standard error of estimate: Curvilinear	F-Value
				Percent		
Overland flow	Wheatgrass	.839	.923	4.6	4.0	4.49[1]
	Cheatgrass	.888	.954	5.0	3.7	7.43[2]
				Pounds per acre		
Soil erosion	Wheatgrass	.979	.996	186	160	18.75[1]
	Cheatgrass	.989	.998	119	100	25.56[2]

[1]Significant F-value at 5 percent level = 4.26.
[2]Significant F-value at 5 percent level = 3.98.

Which of the several site characteristics, found to be significant by the "t" test, operated dominantly to influence overland flow and erosion was determined by separating out the net influence of each in combination with the others by means of multiple linear regression analyses. These analyses, following the methods of Kincer and Mattice (*4*) and of Harper and Wyman (*3*), indicated ground cover density and maximum bare openings to be the two site characteristics which, when combined, exert the most dominant influence on overland flow and erosion from both the wheatgrass and cheatgrass types. When the characteristics of root abundance, soil depth, and erosion pavement were each added as a third factor, they contributed no additional significant influence.

All data were further subjected to multiple curvilinear regression analyses using the graphic method of successive approximations (*2*). These analyses substantiated the earlier conclusions that density of ground cover and size of bare soil openings were the two site characteristics which combine to exercise the greatest influence on overland flow and soil erosion. The high correlation coefficients and indices in Table 2 show the close degree of relationship of overland flow and erosion to these two site characteristics. The increased precision gained by the use of curvilinear regression is reflected by reductions in the standard errors of overland flow and erosion estimates. A test of significance of departure of curvilinear from linear regression disclosed that the curvilinear regressions were, in each case, significant improvements over the linear ones as indicated by the significant F-values in Table 2 (*9*).

Ground Cover Density—Bare Soil Opening Effects

The average net effects of ground cover density and size of bare opening on overland flow and erosion from the wheatgrass and cheatgrass plots are shown in Figures 1 and 2 by the final regression curves obtained from the multiple curvilinear regression analyses.

On overland flow.—The curves in Figure 1-A show that an increase in ground cover density from 10 percent to about 70 percent resulted in a substantial reduction of runoff from both range types. An increase in ground cover density beyond 70 percent, however, was not materially effective in further reducing overland flow.

The amount of overland flow associated with ground cover density, however, was influenced by the size of bare soil areas between plants (Fig. 1-B). The amount of overland flow associated with wheatgrass ground cover density was reduced by as much as 4.5 percent with maximum bare openings of zero and increased by as much as 2.5 percent with openings of 40 inches. The amount of overland flow associated with cheatgrass ground cover density was somewhat similarly affected by the size of bare openings. In short, large bare soil areas between plants decreased the effectiveness of a given

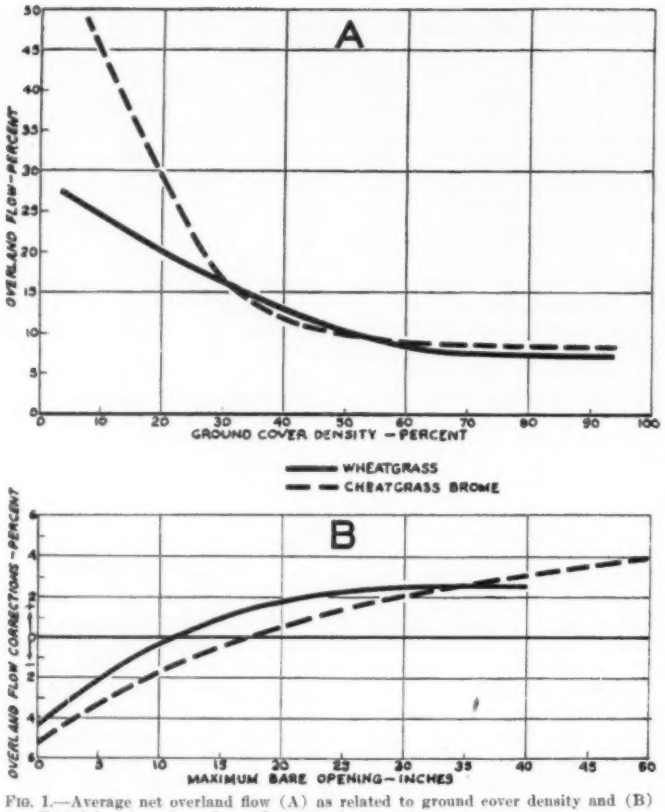

FIG. 1.—Average net overland flow (A) as related to ground cover density and (B) as affected by size of maximum bare opening.

ground cover density in controlling overland flow, and small bare areas enhanced its effectiveness.

On soil erosion.—The curves in Figure 2-A illustrate the average net effects of maximum bare openings on soil erosion. These reveal that, under average ground cover density conditions, both range types produced about 2,800 pounds of eroded soil per acre when the bare soil openings were as large as 40 inches. With bare soil openings of zero, the amount of erosion was reduced to about 440 pounds per acre. There was no range in the size of maximum bare openings that exerted equal control over erosion and the greatest rate of decrease in erosion occurred when bare soil openings were between 10 inches and zero.

The amount of soil erosion associated with a given size of bare opening was increased in the wheatgrass type by as much as 650 pounds per acre when ground cover densities were as low as 10 percent, and reduced by as much as 400 pounds per acre when ground cover densities were as high as 70 percent (Fig. 2-B). In the cheatgrass type, the amount of erosion associated with bare openings was increased by as much as 730 pounds with ground cover densities of 10 percent and decreased by about 250 pounds per acre when ground cover density was 70 percent. The amount of erosion associated with bare soil openings was not materially reduced in either range type by ground cover densities in excess of 70 percent.

Development of Protection Requirements

From the relations shown by the net regression curves it is obvious that minimum amounts of overland flow and soil erosion occur on both range types when conditions of zero bare soil opening and 100 percent ground cover density prevail. Almost as much control can be expected when a maximum bare opening of zero is combined with ground cover densities as low as about 70 percent.

The actual degree of control to be expected on the range, however, is contingent upon the manner in which given ground cover densities and given maximum bare openings occur together. The 200 supplemental plots provided information on the frequency with which various sizes of bare openings were found to be associated with several classes of ground cover densities on each of the two range types. These relations are shown in Figure 3.

The ground cover density-bare soil opening relations shown by the curves in Figure 3 together with those in Figures 1 and 2 furnished a basis for estimating the amounts of overland flow and erosion that may be expected to occur under surface conditions actually existing on the ground. In Figure 3, for example, curve number 1 for wheatgrass shows that a 4-inch bare soil opening is the maximum to be expected where the prevailing ground cover density is at least 90 percent. According to the curves in Figures 1-A and 1-B, the amount of overland flow to be expected from a wheatgrass density of 90 percent is about 7.4 percent but this amount is subject to a reduction of 2.6 percent under the influence of a 4-inch bare opening. Thus, the estimated maximum overland flow from this combination of density and bare opening is about 4.8 percent. The same procedure was followed to obtain estimates of the amounts of overland flow and erosion expected to occur in 100 percent of cases under the ground cover densities for both range types (Table 3).

Wheatgrass range.—As shown in Table 3 wheatgrass sites of both 90 percent and 70 percent density have similar maximum bare openings of 4 inches. The maximum amounts of overland flow and of erosion from each of

these two combinations of density and bare opening are also very nearly the same. On the other hand, with densities of less than 70 percent the size of the largest bare opening is materially greater, resulting in substantially larger amounts of both overland flow and erosion. It appears reasonable to conclude therefore, that the minimum requirements for effective protection of undisturbed wheatgrass watershed lands are ground cover densities of at least 70 percent and bare soil openings of no more than 4 inches.

Cheatgrass range.—The requirements for effective control of overland flow and erosion on cheatgrass range appear to be somewhat different than on wheatgrass. The smallest amounts of overland flow and erosion result from ground cover densities of 90 percent or more in combinations with bare soil openings of no more than 2 inches. With lower densities the size of bare openings is appreciably greater, for example, being 5 inches at a density of 70 percent. These conditions permit an amount of overland flow about one-third greater than that from a density of 90 percent and an amount of soil erosion nearly doubled. Still larger amounts occur from lesser densities in which the size of bare openings is substantially greater. Accordingly, the requirements for effective protection of undisturbed cheatgrass watershed lands appear to be a ground cover density of at least 90 percent and a bare soil opening of not more than 2 inches.

However, curve Number 2 for cheatgrass in Figure 3 shows that a maximum bare soil opening of 2 inches is also encountered in about 94 percent of cases where ground cover densities are as low as 70 percent. The maximum amounts of overland flow and erosion under these conditions were estimated to be 4.0 percent and 358 pounds per acre which are very nearly equal to the values of 3.9 percent and 345 pounds per acre expected from a density of 90 percent with a 2-inch bare opening. It appears reasonable to conclude, therefore that in the vast majority of cases densities of at least 70 percent and bare soil openings of no more than 2 inches comprise the necessary minimum requirements for effective protection of undisturbed cheatgrass watersheds on granitic soil.

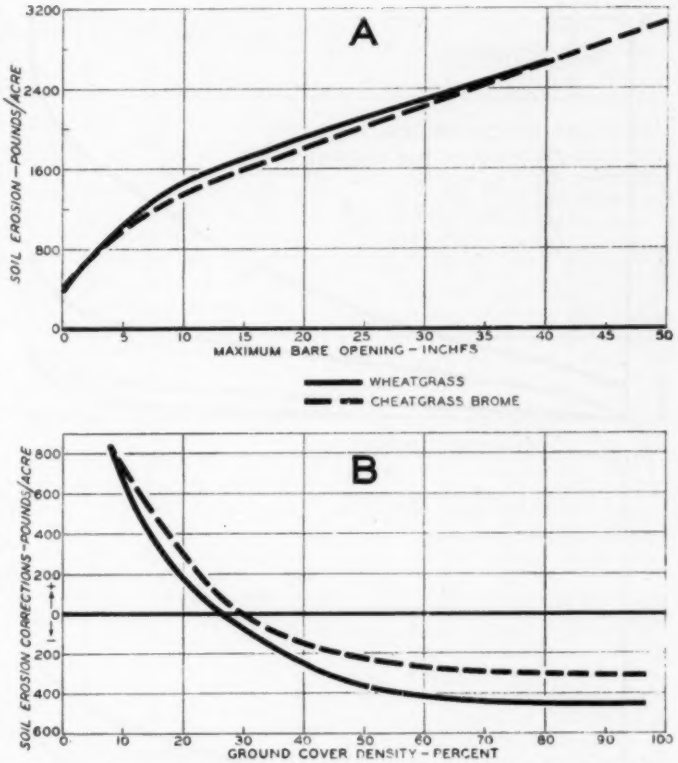

FIG. 2.—Average net soil erosion (A) as related to size of maximum bare openings and (B) as affected by ground cover density.

TABLE 3.—MAXIMUM BARE SOIL OPENINGS AND MAXIMUM AMOUNTS OF OVERLAND FLOW AND EROSION OCCURRING IN 100 PERCENT OF CASES FROM WHEATGRASS AND CHEATGRASS SITES AT DIFFERENT GROUND COVER DENSITIES

Minimum ground cover density	Wheatgrass			Cheatgrass		
	Bare soil opening	Overland flow	Soil erosion	Bare soil opening	Overland flow	Soil erosion
Percent	*Inches*	*Percent*	*Pounds per acre*	*Inches*	*Percent*	*Pounds per acre*
90	4	4.8	476	2	3.9	345
70	4	5.0	493	5	5.1	670
50	11	10.1	1,157	8	7.4	991
30	25	18.9	2,035	13	15.5	1,486

The results of this study are probably of direct application only to comparable ungrazed range. Further tests may reveal whether or not the same density of ground cover and sizes of bare soil opening afford equally good control on grazed range. A similar approach should prove useful in developing criteria for determining the watershed protection requirements of other plant covers and soils.

Summary

In southwestern Idaho plots on ungrazed wheatgrass and cheatgrass range having coarse granitic soil were subjected to 1.80 inches of constant rate rainfall by means of an infiltrometer. Values of nine site characteristics were related to amounts of runoff and eroded soil.

Total ground cover (basal area

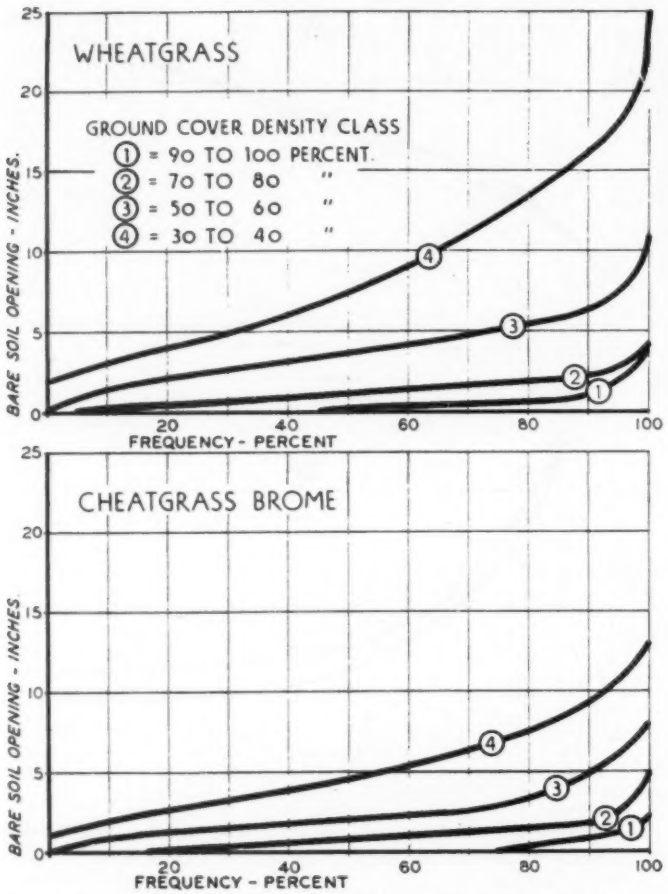
WHEATGRASS
GROUND COVER DENSITY CLASS
① = 90 TO 100 PERCENT.
② = 70 TO 80 "
③ = 50 TO 60 "
④ = 30 TO 40 "
BARE SOIL OPENING - INCHES.
FREQUENCY - PERCENT
CHEATGRASS BROME
BARE SOIL OPENING - INCHES
FREQUENCY - PERCENT

FIG. 3.—Frequency-distribution of bare soil openings within different ground cover density classes on wheatgrass and cheatgrass sites.

of plants plus litter) and maximum size of bare soil openings were found to be the two characteristics most highly related to overland flow and erosion on both range types.

Overland flow and erosion decreased with increase in ground cover density and with decrease in the size of bare openings. These relations were curvilinear.

Ground cover density was the most influential site characteristic affecting overland flow, but the controlling influence of a given ground cover density was substantially decreased when the size of maximum bare openings was large, and was increased when the bare openings were small.

The size of maximum bare openings was the most influential characteristic affecting soil erosion but the effectiveness of this characteristic for control purposes was lessened under conditions of sparse ground cover, and was increased under conditions of dense ground cover.

It is concluded that the goal of management for the best sites on wheatgrass range should be ground cover densities of 70 percent or more in combination with maximum bare openings of 4 inches or less; and on cheatgrass range, a ground cover density of at least 70 percent and bare soil openings no larger than 2 inches. On less favorable sites management should strive for as much ground cover as possible and particularly for the most uniform possible dispersion of the plant and litter mantle.

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A Rapid Method of Locating Contour Lines On a Topographic Map

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FORESTERS AND CIVIL ENGINEERS are frequently called upon to do the drafting work necessary in the compilation of topographic maps. In most cases it is very desirable that such maps be accurate as to the location of contour lines. Accuracy in drafting is usually expected to be performed with a minimum of field data at hand.

The usual field procedure is to take elevations on a grid system or to take random elevations wherever there is a change in the surface profile. In the office these points are plotted on the base map and the elevation is recorded at each point. Then the most time consuming part of the operation is the location of the contour lines between these points of known elevation. The standard procedure is to use one of two methods.

One method consists in solving a simple mathematical proportion to determine the horizontal distance from the point of known elevation to the first contour line, then solving another proportion to determine the horizontal distance to the next contour line, etc. This method is accurate, but very time consuming.

Another procedure consists in using the triangle in conjunction with the engineer's scale. This method is simply an adaptation of the principle of dividing a line into a number of equal parts by using a diagonal line. The principle is described in most standard text books of surveying or engineering drawing. The latter method is rapid and accurate when working with large scales and long distances, but in the case of small distances and small scales it becomes almost impossible to maneuver both the triangle and the scale simultaneously with a high degree of accuracy.

The Contour Interpolator

The difficulties described above led to the seeking of a better and faster method that would give reasonably accurate results. This investigation resulted in the development of the contour interpolator. Fundamentally the contour interpolator is another adaptation of the principle mentioned previously of dividing a line into a number of equal parts by means of a diagonal line. It is also of very simple construction and can be easily duplicated in the ordinary drafting room. Furthermore the device can readily be adapted to suit various vertical or horizontal scales. The use of the interpolator may save over half the drafting time required in certain phases of many topographic mapping assignments.

The contour interpolator can be constructed as follows: Take any convenient size of graph paper with uniform graduation along both the "X" and "Y" axes. (The X and Y scales need not coincide.) Graduate the horizontal scale so as to accommodate the largest horizontal distance between adjacent points of known elevation, and in a similar fashion graduate the vertical scale to take care of the greatest difference in elevation between adjacent points. For convenience mount this graph on a small board such as a small section of a drawing board or a piece of masonite which can readily be handled on the drafting table.

Then take a strip of cellulose acetate or similar transparent material about a half-inch wide and as long as the greatest diagonal distance on the above graph. A developed photographic negative that had never been exposed makes a very desirable substitute. With a draftsman's ruling pen and India ink draw a line from one end to the other of this acetate strip so as to bisect approximately the strip at either end. Next use an old phonograph needle and securely fasten one end of the strip to the graph by passing the needle through the line on the strip and thence through the origin on the graph so that the index line of the strip can be rotated about that point.

Figure 1 shows how the device is used. Lines A and B represent different positions of the acetate strip to simulate different actual conditions. Let us now take one or two hypothetical cases to see how the interpolator is used:

CASE ONE—Given are two points with a difference in elevation of 2.8 feet, and separated by a horizontal distance of 60 feet. The

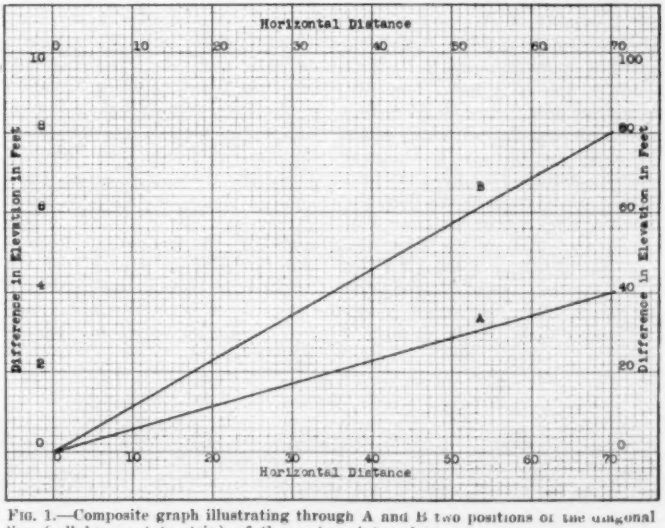

FIG. 1.—Composite graph illustrating through A and B two positions of the diagonal line (cellulose acetate strip) of the contour interpolator.

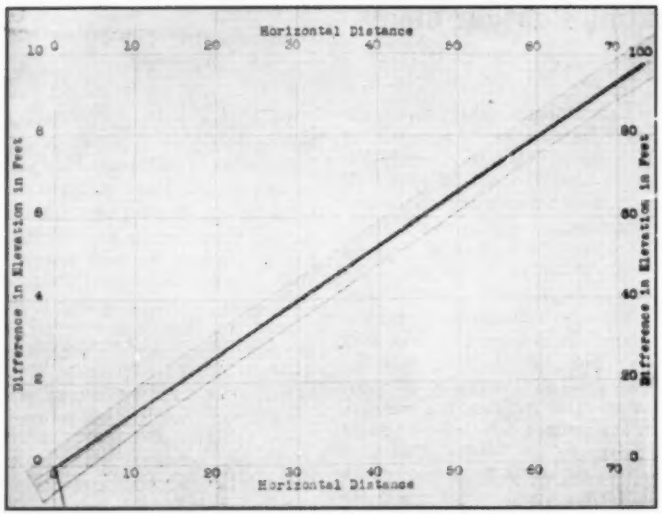

FIG. 2.—The contour interpolator showing how the rotating diagonal line is fixed at the origin.

contour map is being plotted on a 1-foot contour interval. It is a simple matter to calculate mentally that the vertical distance from the point of lower elevation to the first contour is .4 foot. The acetate strip is rotated to the position of Line A in Figure 1. Reading from the left hand vertical scale (since it is graduated to suit a small contour interval and a small difference in elevation) at the .4-foot mark across to line A and then down to the horizontal scale we find that the horizontal distance from the point of lower elevation to the first contour line is 8 feet. This distance is scaled according to the map scale and the point is marked. To locate the distance to the next contour line we read from the left-hand vertical scale across from the 2.4-foot mark (since we know that at a 1-foot interval the next contour would fall on a point 2.4 feet above the lower point of elevation) to line A and then down to the horizontal scale. This gives us a horizontal distance of 42 feet from the lower of the two points to a point on the second contour line. We know that only two contours would pass between these two points therefore we move on to another pair of points to make similar calculations.

CASE TWO.—We have given two points with a difference of 80 feet in elevation between them, and they are separated by a horizontal distance of 70 feet. The topographic map is being plotted with a contour interval of 20 feet. We calculate mentally that the vertical distance from the point of lower elevation to the first contour line is 5 feet. The acetate strip is now rotated to the position of Line B in Figure 1. This time reading from the right hand vertical scale (since the graduations on this scale are better suited to the horizontal distance and the contour interval) at the 5 foot mark across to line A and thence down to the horizontal scale we find that the horizontal distance from the point of lower elevation to the first contour line is 4 feet. To determine the distances to the succeeding contour lines we read across from the 25-, 45-, and 65-foot marks on the right hand vertical scale to the diagonal line and then down to the corresponding points on the horizontal scale. The locations of these contours are at points a horizontal distance of 22 feet, 39.5 feet, and 57.5 feet respectively, from the point of lower elevation.

These examples should serve to give the reader a fair idea of how the interpolator can be used to locate the positions of contour lines between points of known elevations. The accuracy of the results depends largely upon the scale used in constructing the graph and the care used in making sure that the swinging line is secured at the point of origin. If these precautions are followed, the readings from the interpolator can be made as closely as the points can be plotted on the base map with an engineer's scale.

Summary

The contour interpolator is a simple device that can be made in a matter of a few minutes in any drafting room, and can be constructed at a scale to meet any set of conditions encountered in topographic mapping. The use of this simple instrument can save up to one half of the time required in plotting contours in most topographic mapping work. This is especially true if the points of known elevation lie very near to each other on the map. The method is equally well adapted to plotting maps from elevation data taken on a coordinate system or from elevation data taken randomly. The device is accurate for all practical purposes.

Hydrocarbon Content and Storage Period Affect Toxicity of Mineral Spirits Used as Selective Herbicides for Red Pine Nursery Beds[1]

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SPRAYING CONIFER NURSERY BEDS with petroleum products known as mineral spirits or naphthas has lowered weeding costs by as much as 50 to 90 percent, and as a result, these sprays are coming into rather general use. Unfortunately, they are lethal to most broadleaf species.

The mineral spirits generally used have an initial boiling point of about 315 degrees F., a gravity (A.P.I.) of 48.9, a specific gravity of 0.78, and an aromatic hydrocarbon content of 10 to 15 percent. So-called "fortified solvents" may contain up to 20 or 22 percent of aromatic hydrocarbons. They are marketed under such trade names as Stoddard Solvent, Sovasol No. 5, Stanisol, Varsol, etc. When used as herbicides in conifer nurseries, they usually are applied full strength at a rate ranging from 20 to 80 gallons per acre—in the form of a fine spray under a pressure of 50 to 75 or more pounds.

Much variability has been reported in the comparative weed kill by mineral spirits, ranging from 10 to 100 percent in different experiments. Differences have been reported as being influenced especially by the amount of material used per acre and the size and species of weeds (*1, 5*). Reaction of the trees to the sprays has also varied considerably depending on the species, age class, moisture conditions, shade, and air temperatures (*3, 4*).

Effects of Aromatic Content on Herbicidal Properties

Nurserymen have suspected for some time that an additional reason for the differences in results is due to variation in content of aromatic hydrocarbons of various solvents. To obtain a more definite answer on this point, an experiment was installed in the spring of 1950 on first-year seedbeds of red pine (*Pinus resinosa*) in the Hugo Sauer Nursery at Rhinelander, Wis. Mineral spirits of 12 and 22 percent aromatic hydrocarbon content were tested at five levels of treatment. The regular mineral spirits (12 percent aromatic content) were applied at rates of 50 and 80 gallons per acre. The fortified spirits (22 percent aromatic content) were applied at 27.25, 44.6, and 50 gallons per acre. Materials for the test were furnished by the Socony-Vacuum Oil Company.

The beds were seeded in May with red pine seed carefully weighed out at the rate of 1 gram of seed per square foot of experimental plot; each treatment was replicated five times. On July 26 the beds were sprayed with mineral spirits. During spraying all beds were shielded with a double layer of cloth placed around the individual beds to a height of 14 inches to prevent drift of spray to adjoining plots. Sprays were applied with a "flit" gun so modified as to allow complete evacuation of the contents, which were measured out to the nearest cubic centimeter. Weeds averaged about 1 to 2 inches high when sprayed, whereas, in regular practice, they usually are under 1 inch high when sprayed. Counts of weeds and trees were made just preceding spraying and at appropriate intervals thereafter to appraise weed kill and any tendency toward tree injury.

All treatments were effective in controlling weeds when compared to the untreated check (Table 1). Where the total amount of aromatics applied was comparable, weed kill also was comparable 3 days after treatment, whether regular or fortified mineral spirits were used. Even 3 weeks after spraying, the results were fairly comparable. The 50 gallons of fortified mineral spirits gave twice as good weed control as the same amount of regular mineral spirits. Such differences as there were in tree stand were not significant.

Some of the seedlings developed a reddish-brown tinge on the outer part of the needles. It was observed (Table 2) that there was a tendency toward a higher percent of off-color trees at 5 and 35 days after treatment with the higher dosages of fortified solvents (Treatments 5 and 6) but that by end of the season the discoloration had largely disappeared and the trees were similar in coloration to those in the check plots. Some of the discoloration is associated with "oil burn," but not all of it can be attributed to this cause because there was a considerable amount of it on August 30 even in check plots. However, it had decreased by two-thirds by the end of the season.

With dosages of 50 gallons or less per acre, there was no appreciable

TABLE 1.—WEED KILL AND TREE STAND IN FIRST-YEAR RED PINE SEEDBEDS

Treatment number	Treatment and type of mineral spirits used[2]	Aromatic hydrocarbon content	Spray per acre	Increase or decrease in weed stand[3]		Tree stand per square foot at end of season
				3 days after spraying	26 days after spraying	
		Percent	*Gallons*	*Percent*		*Number*
1	Check	....	0	+16	+28	26.8
2	Regular	12	50	−23	− 7	24.7
3	Fortified	22	27.25	−16	+ 8	28.5
4	Regular	12	80	−46	−35	26.5
5	Fortified	22	44.6	−49	−38	28.5
6	Fortified	22	50	−49	−40	27.8

[2]Treatments 2 and 3 are equivalent in total aromatic hydrocarbon volume, as are Treatments 4 and 5. All spraying was done July 26, 1950.
[3]Percentages based on the stand of weeds in each treatment just before spraying.

[1]Credit is due to E. R. Stoltz of the Research Center Staff for aid in collecting and summarizing field data.

TABLE 2.—TREE INJURY AND MORTALITY IN FIRST-YEAR RED PINE SEEDBEDS

Treatment number	Treatment and type of mineral spirits used	Aromatic hydrocarbon content	Spray per acre	Trees off-color or injured			Dead trees per square foot	Total mortality[1]
				5 days after spray	35 days after spray	End of season Dec. 18, 1950		
		Percent	*Gallons*	*Percent*			*Number*	*Percent*
1	Check		0	0.7	15.6	5.2	.36	1.3
2	Regular	12	50	0	20.1	8.6	.92	3.6
3	Fortified	22	27.25	1.2	17.9	4.9	.76	2.6
4	Regular	12	80	0.6	13.8	3.9	2.12	7.4
5	Fortified	22	44.6	5.2	33.4	7.3	.76	2.6
6	Fortified	22	50	7.1	40.4	5.3	1.12	3.9

[1]Based on percent of total potential stand.

TABLE 3.—WEED KILL, TREE INJURY, AND MORTALITY IN SECOND-YEAR RED PINE SEEDBEDS

Treatment number	Treatment and type of mineral spirits used[1]	Aromatic hydrocarbon content	Spray per acre	Increase or decrease in weed stand[2]		Trees showing oil injury 6 days after spraying	Reduction in tree stand 26 days after spraying
				6 days after spraying	26 days after spraying		
		Percent	*Gallons*	*Percent*		*Percent*	*Percent*
1	Check		0	+9	−32	0	1.1
2	Regular	12	50	−58	−76	0	1.2
3	Fortified	22	27.25	−52	−53	1.2	2.4
4	Regular	12	80	−81	−70	0	1.7
5	Fortified	22	44.6	−87	−87	5.5	1.8
6	Fortified	22	50	−90	−87	7.6	1.6

[1]Treatments 2 and 3 are equivalent in total aromatic hydrocarbon volume, as are treatments 4 and 5. All spraying was done July 20, 1950.
[2]Based on stand of weeds just before treatment.

tree mortality (Table 2). Somewhat higher mortality occurred where 80 gallons per acre were used. However, the loss of a few percent of the trees by spraying is no greater than normally occurs with mechanical or hand weeding.

Another test of regular and fortified Stoddard Solvent was made on July 20 on second-year red pine. The beds were mechanically seeded and had a density of about 85 trees per square foot. Each treatment was replicated five times.

Counts on these beds also showed approximately the same initial weed kill in comparable treatments of regular and fortified mineral spirits (Table 3). The kill of weeds was quite satisfactory with treatments of 44.6 to 50.0 gallons per acre of fortified mineral spirits, or 80 gallons of the regular type generally used for weeding forest nurseries in Wisconsin.

Tree injury within a week after spraying (as also observed for 1-0 stock) was somewhat higher where the heavier treatments of fortified solvents were used, but by end of the season it had disappeared almost completely.

Tree mortality that occurred in the 26-day period after spraying was negligible. Seldom was it more than 1 percent higher than in check beds.

Comparison of Costs of Fortified and Ordinary Stoddard Solvent

At the time these tests were made, fortified Stoddard Solvent cost 28.7 cents a gallon f.o.b., Rhinelander, compared with 23.2 cents for the regular solvent. With 44.6 and 80.0 gallons per acre, respectively of the two materials, their per-acre cost would be $12.80 and $18.56. By use of the fortified solvent, therefore, the cost of spray material is reduced by about one-third. On the basis, fortified spirits would seem to be worthy of small-scale trial by nurserymen, starting first with those tree species such as red and jack pine which can stand fairly high dosages of mineral spirits without sustaining significant injury.

Prolonged Storage of Mineral Spirits Appears to Increase Tree Injury

Present evidence is that petroleum naphthas stored for over a year may have a tendency to cause more injury to the trees than comparatively fresh materials.

In a series of tests with solvents which had been stored for about 14 months before use, heavy damage was noted in the first-year red pine seedlings. At end of the season, 34.6 percent of the trees still showed "oil burn" from a treatment of 60 gallons of this material. In other beds treated with 80 gallons of fresh solvent, only 3.9 percent of the trees showed injury.

It is believed some chemical change had occurred in storage which increased the tendency toward injury of the pine needles, which showed up as a reddish-pink color of the foliage and somewhat puffy-appearing leaf tissues.

Crafts and Reiber (*2*) point out that there is a tendency for lighter fraction oils, such as gasoline and kerosene to become more toxic and to lose selectivity after long storage. They believe it is due to accumulation of peroxides through oxidation of aliphatic components of the oil in the absence of aromatic hydrocarbons. The aromatics, however, act as natural anti-oxidants; hence, this explanation of loss of selectivity may not apply to mineral spirits because they contain substantial amounts of aromatics.

Pending a solution of this problem and repeated verification in other tests, it would appear safest for nurserymen to avoid carry-over of large quantities of mineral spirits from one season to the next and to dilute any carry-over with fresh materials purchased not over a few months before spraying. Applying old sprays at minimum effective dosages and in cooler weather also may reduce injury.

Summary and Conclusions

1. The kill of weeds obtained by mineral spirit sprays in first- and second-year red pine seedbeds varied with the content of aromatic hydrocarbons—the higher the aromatic content, the larger the percent of weeds killed.

2. There was a tendency toward a higher percent of temporary oil injury to the trees treated with solvents in the heavier treatments, but the symptoms practically disappeared by end of the season.

3. Considering cost of materials

per acre and comparative weed kill, there was a saving of about one-third in favor of the fortified solvent. It appears that nurserymen might well make small-scale trials of the fortified solvents, beginning such tests on the more oil-resistant pine species and at dosages of 50 to 65 percent of the amount per acre normally used with regular solvents.

4. Mineral spirits stored for a period of 14 months caused about ten times as much damage to the tree crop as fresh materials, presumably because of some chemical changes in storage. This would suggest that nurserymen avoid carrying over any large quantity from one year to the next. Dilution of the carry-over with larger quantities of fresh materials may reduce tree damage from such carry-over spray material.

5. Although the tests reported dealt exclusively with red pine, it is believed that the results will be generally applicable to the other coniferous species commonly grown in Lake States conifer nurseries.

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Annual Cuttings Unsound in Unmanaged Woodlots

The article on annual yield from small woodlands by H. H. Chapman in the May 1951 JOURNAL OF FORESTRY struck a responsive chord. The annual cut may or may not sell forestry to the farmer. It seems unlikely that it would sell the small woodland owner who is not a farmer. From the silvicultural standpoint there is little doubt that a strict annual cut *in all portions* of the woodland will ultimately do harm to Central, Northern, and Appalachian hardwood stands.

There is one important point which Chapman failed to specify and which makes an annual cut undesirable during the initial stages of management on most of our hardwood stands. The majority of our farm woodlands are unmanaged. They carry an overburden of poor species, culls, and nongrowing stock merchantable trees. True growing stock trees often may constitute less than fifty percent of the basal area of the stand. This condition is very prevalent, especially in small farm woodlands. If this is true, then how can an annual cut be sustained without definite loss of future quality growth and desirable reproduction?

The first logical step in such a stand would be a rehabilitation operation to remove or kill the overburden of unwanted low value and cull trees to allow reproduction in the holes created and rapid growth on the remaining crop trees. The only way this can be done on an annual basis is to cut only a portion of the woodland each year, i.e. do a complete silvicultural job on a small portion, then move on to another portion the following year. The owner must realize, however, that he is losing valuable growth every year any portion remains in its unimproved condition.

An annual cut on the depleted unmanaged stand is difficult to defend from a silvicultural standpoint. This point is important in this country at the present time. However, if we assume a well-managed and well-stocked stand, an annual cut on a portion-per year basis could be done without violating good silviculture, if the annual cut best fits the owner's economic requirements and if cutting is done in accordance with conditions necessary to obtain reproduction of desirable species.

To sum up, it appears to me that an annual cut in unmanaged, depleted, and poor quality farm woods is unsound from both an economic and a silvicultural standpoint. An annual cut in well-stocked managed stands is silviculturally defensible on a portion-per-year basis but economically it may or may not be desirable, depending upon the requirements of the owner.

LEON S. MINCKLER,
Member, S.A.F.

Notes

The Gifford Pinchot Medal

The Gifford Pinchot medal was awarded for the first time at the Society's 50th anniversary meeting in Washington, D. C., on December 15, 1950. This medal, the gift of Mrs. Pinchot, was designed by Gifford MacGregor Proctor, a well-known sculptor of Wilton, Conn.

Because this medal is so different from the conventionel bronze or gold medal, Mr. Proctor was invited to describe the problems and process he followed in making it. His statement follows.

The idea of using steel and the gold was Mrs. Pinchot's, to which I took an immediate shine. Having long got pleasure from the gilt designings of medieval armor and feeling that the strength of the steel and the warmth of the gold sort of typified Gifford Pinchot, Mrs. Pinchot was extremely keen to have this medal of those materials.

The idea was completely novel. I, myself, know of no other medal, produced in quantity or otherwise, done in these materials. The idea of doing a medal which would be unique appealed to me, despite the problems which would inevitably arise.

The problems were:

1. Whether it was at all feasible to produce a medal in steel.
2. Whether a *portrait* medal could be satisfactorily produced in steel.
3. Whether it was possible, under the circumstances, to produce a series of these portrait medals in steel.
4. What about gliding on steel?

The first thing that had to be decided was whether it could be done.

Three people I knew seemed to be the most knowing on this subject: Kenneth Lynch, armorer and metal craftsman; and Messrs. Grancey and Heinrich of the Metropolitan Museum, respectively curator and armorer of the Museum's Armor Department.

Discussions with these three regarding formulas, techniques, materials, processes, plus a mass of research from other sources revealed that it would be possible to attempt such a medal, but the indications pointed toward my being an idiot if I tried it.

However, by this time I had become so intrigued with the whole idea that I resolved to risk the attempt and advised Mrs. Pinchot that I'd do it in steel and gold, and thereupon embarked upon the walk where angels, being better informed, and wiser, feared to tread.

My estimates were based upon days of work, broken down into hours. That's where the angels knew better. The days became months, broken down into weeks. Literally.

A project of this type could become absolutely prohibitive in cost, completely out of hand in every way, if it weren't carefully controlled.

The procurement of quarter-inch plate steel alone became a major problem. Every effort on my part proved fruitless. Finally, a friend of Mrs. Pinchot's, an engineer, managed to obtain the two plates required which weighed forty pounds.

Then the problem of finishing the steel to the required surface became a problem. The plates ended up miles from my studio for polishing, only to find that polishing would not suffice, that surface grinding would also be required, necessitating more trips and transfers of the metal for other operations.

While this was going on, the techniques and processes of etching the steel were taken into consideration, and test after test made of different formulas.

The necessity of producing a series of these medals, rather than just one individual piece, further complicated the problem for the design incorporating a portrait of the Governor, necessitated a degree of accuracy of reproduction which would normally not be required in the usual etchings of steel as found in the ornamentation of armor where a line being slightly to this side or that wouldn't matter. In a portrait as small as that on the Pinchot medal, if the lines vary in any direction at all the result is no longer a portrait but simply a picture of a man.

A stock of chemicals and acids, a stack of formulas and notes, were all building up in the studio.

Consideration, meanwhile, was being given to the gilding of the steel. One of the favorite techniques of gilding armor by the ancients was mercury gilding. Mr. Heinrich informed me. This technique, I also learned, is so poisonous a process that it is against the law to use that technique in New York. Other possible techniques were studied, other people were courteous enough to offer their knowledge too, with the result that I finally decided to gild the steel myself by electro-plating.

Electro-plating meant my going into the research on that subject too, and about this time I really began to realize that the aforementioned angels really had something and that ignorance isn't necessarily bliss!

Engraving the design, it ultimately became apparent, wouldn't give the desired result, and etching was settled upon as the process which would be used to get what we had in mind.

The individual etching of a group of these medals would involve a prohibitive effort so a process was selected which would combine the process of etchings, by acids, and which would yet give the

required portraiture duplicated on the number of medals desired. Photo-etching was selected to achieve the finished product we were striving for.

Photo etching on steel is a very unusual type of work, complicated by the extraordinary weight of the steel plates to be etched. The solving of this problem required a great deal of research and further tests.

All this while, Mrs. Pinchot and I had many conferences and discussions on these technical matters, and the working out of the design of the medal, and the portraiture. Sketches had to be settled on and final designs approved, and so on.

Deadlines, estimated in ignorance of the innumerable problems involved, passed, and "tempus fugited" while all of us concerned with the matter fidgeted.

Finally, through the great helpfulness of a multitude of people such as our local pharmacists who supplied the deadly acids and advice, through the kind and courteous assistance of patient and helpful photo engravers and many others, including Mrs. Pinchot's patience and understanding, we ended up with an unusual medal and I with a great deal more knowledge than I had before starting the medal and a shelf full of poisonous and mordant acids which I'll find it plenty hard ever to use again.

It has been a most interesting and satisfying experience.

GIFFORD PROCTOR.

Mr. Proctor studied with his father, A. Phimister Proctor; was given a B.F.A. degree by Yale University; held a two-year *Prix de Rome* Fellowship at the American Academy in Rome; studied art for a total of five years in Europe, four and a half years in Italy, and one in Belgium, traveling throughout Europe and the Near East. At present he is working on the two seven-foot statues which will represent the State of Oregon in Statuary Hall in the National Capitol, in addition to several medals and portraits, including a medal for the Camp Fire Club of America, and several garden pieces.

Bear and Squirrel Damage To Young Redwood

In the May 1951 JOURNAL OF FORESTRY[1] the formation of a committee to study damage to young Douglas-fir trees by bears is reported. Bear damage is taking on serious proportions also in some sections of the California redwood region. That black bears damage trees by clawing has long been known. But that they completely strip trees appears to be something new and the reason for it is not yet clear. Zoologists of the University of California, asked to make a thorough study, completed a preliminary examination two years ago. They are considering the possibility that the stripping is the result of a pathological condition among the bears and that the animals might require some medication which they found in the juicy new spring wood under the bark. A very observant rancher, Glenn Timmons of Exeter, Humboldt County, California on whose range is a large amount of second growth, believes that a she-bear, discovering that the layer of new springwood cells is like a sweet confection, taught the trick of exposing it to her cubs who, in turn, passed on the habit. The black bear's love for sweets is well known. At first the girdled trees were few, then increased rapidly. Two years ago a state hunter killed a number of bears in the locality and this year the damage is reportedly less. A year-round open season has been declared for the hunting of bears in this locality.

In the redwood region, only young redwood trees from pole-size to about 30 inches d.b.h. and up to about 25 years old are attacked. Douglas-firs mixed with the redwoods have not been found attacked. Bark is stripped off the trunk from the ground line up to a point where the diameter is about 4 inches and the trunk is not strong enough to support the weight of a bear. The upper limit of stripping may be higher than 50 feet from the ground. Several 24-inch trees were found to have broken tops, possibly broken by a heavy animal. Although some trees are merely girdled in the butt log, most of them are completely naked from the ground line to the 4-inch point. The bark seems to be torn off by the claws, although claw marks are few.

The damage is limited to the spring season approximately May, when the bark is easily removed. Diameter growth in this region begins in March or early April. After a number of new wood cells have generated from the cambium and before these cells are fully grown and lignified, the zone of new wood is quite weak. Furthermore, springwood cells of redwood are quite large and thin-walled even when fully developed. Sap pressure is also high in the spring. After the bark has been removed, the bear apparently licks the freshly exposed juicy wood surface. Apparently the teeth are sometimes used, although tooth marks are not very common. The branch bark is untouched. When freshly peeled, the tree looms up brightly; a year later the needles turn red to make the attacked tree conspicuous from a considerable distance.

The center of "infestation" seems to be the cut-over Little River basin of the Hammond Lumber Co. above Crannell in Humboldt County. The area is fairly well forested with natural and planted redwoods. The attacks were first noted in 1946. In 1949, when the company's foresters, A. H. Merrill and Herb Baer, were making a strip-cruise of the property for a management plan, the great extent of the damage was revealed and became a subject of considerable concern. Both planted and natural trees were found attacked. Altogether more than 10,000 trees, scattered over the area, have been killed. Since the initial report, spot attacks have been noted in the areas adjoining to the north and south.

No one has actually observed the bears at work. Nevertheless that it is bear work, now appears certain. To remove 2-inch thick bark from a 24-inch tree requires a strong paw. There are no porcupines in

[1]Bear facts committee finds stripping bad. Jour. Forestry 49:382, May 1951.

the redwood forest itself, although a few have been seen outside its edges.

Squirrels do considerable damage in scattered spots, but their work is generally limited to large saplings or to the thin-barked areas in the upper crowns of the larger young trees. Squirrel damage was first noted in 1923 and has been reported in the *Journal of Mammalogy* (Vol. 13, No. 1 Feb., 1932, p. 76). Since then many additional centers of damage have been found in San Mateo, Sonoma, Mendocino, and Humboldt Counties. Two additional reliable woodsmen actually have seen the squirrels at work; so it is known how they operate.

Pack rats, which nest on the tops of redwood stumps, occasionally attack the surrounding sprouts, but their damage is even less than that of squirrels.

The main and most significant damage is the complete stripping of young redwoods up to 30 inches, d.b.h., by black bears. This damage, unless controlled, can become a serious deterrent to the extension of forestry in the redwoods.

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Relationship Between Log Characteristics and Lumber Grade Recovery in Second-Growth Douglas-Fir[1]

A major problem confronting the forest products industry of the Pacific Northwest is the estimation of values obtainable from logs; in this case, the quality of lumber that can be expected from second-growth Douglas-fir logs. This investigation attempted to establish log quality classes for second-growth fir by relating lumber grade recovery to external log characteristics.

The presence or absence of clear quarters and the maximum knot size on each study log were the principal observations at the mill pond. The rate of growth (as evidenced by ring count) was recorded at the log slip or deck. The lumber produced from each log was graded and tallied on the green sorting chain. Only sound logs were selected for study since defects such as rot or shake should reduce the scale rather than the grade of the log.

Three mill studies were made in this investigation. The first two were preliminary studies to determine the types of data required and to establish a satisfactory procedure for the collection of data. The third was a study of a representative small fir mill's one-day production, employing the procedures developed.

On the basis of observations and data analyses it seems practical to segregate second-growth Douglas-fir logs into three quality classes for lumber production. The quality class specifications as outlined below are simple to apply and should enable others than experienced graders better to evaluate the relative worth of second-growth logs.

Class A logs are all those containing clear quarters. This class also includes those logs having knots no larger than 1 inch in diameter, provided that more than ⅓ of the log diameter is close-grained wood.

Class B logs are those with knots between 2 and 5 inches in diameter, inclusive, providing more than ⅓ of the log diameter is close-grained wood. This class also includes logs with 1-inch knots in which ⅓ or less of the diameter is close-grained wood.

Class C logs, the poorest class, are those having knots over 5 inches in diameter and those with knots larger than 1 inch but in which ⅓ or less of the log diameter is close-grained wood.

These classes are based upon the only log characteristics which gave satisfactory correlations with lumber grade recovery. Rate of growth, as measured by rings per inch, did not exhibit a uniform correlation with lumber quality except for those logs containing ⅓ or less of the top diameter as close-grained wood.

When the logs included in this investigation were segregated into the suggested quality classes the comparative lumber grade recoveries were as follows:

	No. 1 and Selects	Better	Number of logs
	Percent	*Percent*	
Class A	36	94	75
Class B	17	76	58
Class C	5	57	30

Selects are primarily select structural or select merchantable but include the small percentages of clears which develop in sawing second-growth fir.

The limited number of logs indicates that further data are needed to establish the exact specifications for each quality class. The recommended procedure can provide a guide for further study.

ROBERT E. STERMITZ.

[1]Abstract of thesis prepared for the Master of Science degree in Forest Products, Oregon State College, May, 1951.

An Expendable Seed Trap

A recent study by the Southeastern Forest Experiment Station, in cooperation with the West Virginia Pulp and Paper Company, called for a precise estimate of the number of seeds disseminated by several loblolly pine stands. About 200 ¼-milacre seed traps were needed to obtain an adequate sample of the seed crop. Since each of the standard wire-screen seed traps costs from $3 to $5 for materials, the investment in several hundred traps was too costly. Such traps have a useful life of up to 10 years, but for this study traps were needed for only one seeding year, from September to February.

A corrugated kraft paper-board seed trap was designed with materials costing slightly over $1 each. It was thought that the paper traps could be discarded after the seeding year, but they proved to be surprisingly durable even in the humid climate of the South Carolina Coastal Plain. They will probably last several seeding seasons if taken up and stored during the intervals. One test trap, continuous-

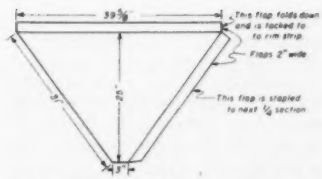

FIG. 1.—Pattern for quarter-section of seed trap.

FIG. 2.—Collecting seeds from paper-board seed trap.

ly exposed for 12 months, still appears structurally sound even though weather-worn.

The prefabricated trap is manufactured to specifications by the International Paper Company, Container Division, Georgetown, S. C. The four identical sections, each a truncated triangle, as in accompanying sketch, are stapled together to form a four-sided pyramid. This is inverted and tacked to a light wooden frame and supported by four wooden legs. A wire basket is attached to the bottom opening to receive the seeds. A 10-inch square of ½-inch mesh hardware cloth is placed inside the trap near the bottom to keep rodents and birds from getting down to the seed.

The following materials are required for each trap:

1—prefabricated paper-board trap of the dimensions shown in sketch. This is constructed of corrugated material, 33-pound-per-thousand-square-feet stock with facings of 69-pound-per-thousand-square-feet stock, combined with weatherproof adhesive.

4—Wooden rim strips ¾ by 2 by 38½ inches, beveled 45 degrees on one edge and tacked to underside of rim flap.

20—Roofing tacks.

4—Wooden supporting legs, ¾ by 2 by 42 inches.

1—10 by 10-inch square of ½-inch hardware cloth.

1—8 by 8-inch screen wire, folded basket shape.

1—Wire pin 8 inches long, for fastening basket.

4—Carriage bolts, washers, and nuts for attaching legs.

A test was made to determine whether this trap might cause vagaries in air currents which would unduly attract or deflect seeds. No significant difference was found between the number of seeds trapped in a series of paper-board traps and the number trapped by the standard screen-wire traps paired with them.

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Westvaco Experimental Forest, and
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Who Likes Square Roots?

Every forester who works with figures has had to find the square root of a number at one time or another. Being lazy in this respect, I refer to Barlow's Tables[1] for square roots whenever possible. If you do not have access to similar tables, but have a calculating machine, you can extract the square root of a number by using a Table of Square Root Divisors.[2] Or you can use the successive odd-digit method.

However, problems arise when you need to work with more significant digits that those shown in Barlow's tables or the Table of Square Root Divisors. And the successive odd-digit method, although it will give you any number of significant digits you need, is cumbersome and time consuming.

In a recent article about symbolic logic and large-scale calculating machines[3] the author, Edmund C. Berkeley, gave as an example the instructions necessary for the machine to extract the square root of a number. If these instructions were simple enough for a machine to follow, it seemed to me that here was a practical method of determining square roots to a large number of significant digits.

Several of us at the Northeastern Forest Experiment Station tried, on ordinary calculating machines, a method adapted from that described by Berkeley. We found it to be practical and easy to learn. In fact, all our statistical clerks and several foresters have now been taught this method.

It works this way:

1. Pre-set the carriage position key and decimal points for quotient dial and keyboard (to as many places as you want in the final answer).

2. Set into the keyboard the number (N) for which you want the square root.

3. By inspection only, decide the nearest perfect square contained within the first two or three digits. Divide N by this approximate square root, D_1.

4. Write down the divisor, D_1, and the quotient, Q_1. Compute the average of these two factors, $D_2 = (D_1 + Q_1) \div 2$. Write down this closer approximate square root.

5. Divide N by the average, D_2. Write down the quotient, Q_2, and compute another average.

6. Repeat this process until both factors D_n and Q_n) agree to as many decimal places as required.

7. Prove your answer by multiplying the square root by itself.

Here is an example: to extract the square root of 74.3658.

D_1	=	9.000 000
Q_1	=	8.262 866
D_2 Average	=	8.631 433
Q_2	=	8.615 696
D_3 Average	=	8.623 565
Q_3	=	8.623 556
D_4 Average	=	8.623 560
Q_4	=	8.623 560

Once you have tried this method, I believe you will continue to use it.

ROLAND H. FERGUSON,
Northeastern Forest Experiment Sation, U.S. Forest Service.
Upper Darby, Pa.

[1]Barlow, Peter. Barlow's tables of squares, cubes, square roots, cube roots, and reciprocals of all integer numbers up to 10,000. 3d Ed., 208 pp. Spon. Ltd., London. 1935.

[2]Copyrighted 1941 by the Marchant Calculating Machine Company. These tables permit computing square root to 5 significant figures.

[3]Berkeley, Edmund C. The relations between symbolic logic and large scale calculating machines. Science 112: 395-399. 1950.

Points of View

Specialized Curricula and the Society

In his helpful and thought-provoking article, "Professional Needs in Forestry Education," in the May 1951 JOURNAL, Myron Krueger seems to take a slant in discussing "specialized curricula" that I believe merits examination since it touches on a fundamental issue. His article is primarily concerned with forestry education as the term is commonly interpreted; i.e., training a man to be an effective forester. But in so doing, some perspective is seemingly lost in looking at the broader matter of training men to enter natural resources fields generally. While recognizing that wildlife management, range management, and wood technology (with some reservations) are tending to become separate professions, he refers to them as "specialized curricula" and discusses the matter of "specialized or adjunctive" courses. Forestry does not seem to be included in this category.

This, it seems to me is purely a matter of viewpoint as Krueger recognizes in a letter published in the April JOURNAL. If one starts from the assumption that forestry is of the parent stuff (which it largely is as a matter of historical fact), then these other curricula can be regarded as specialized and adjunctive. But if one views the natural resource fields as a whole, as did P. A. Herbert in his letter in the April JOURNAL, then one curriculum can be considered as specialized as any other. To a person in the furniture business and fully occupied with wood technology problems, courses in silviculture, forest management and the like seem highly "specialized" and "adjunctive." The same is true for a person engaged in migratory bird work, or one actively in the livestock business.

The broader educational problem is to frame curricula to prepare men for careers in the several natural resource fields. Forestry is certainly one of them and to me of keystone importance. Recognizing and accepting the existence and brotherhood of a wide range of interests and disciplines in natural resources generally should serve to strengthen training in forestry as one major segment of it.

We need to focus on doing a good job of preparing men for this profession. Forestry training should not be diluted unduly to include a tincture of this and that just because a forester "ought to know something about it," nor should sound training in other fields be warped to get in a smattering of forestry. As Krueger says, a fellow can't be everything and certainly not in four or five years. The need is to develop and strengthen the major core of a forester's job which is amply broad and exacting rather than to dissipate effort on an expanding periphery. We have perhaps done too much of the latter in forestry education.

At the same time it is necessary to generate and instill a broad interest in and appreciation of other companion fields and particularly in their integration. This is our real educational problem; that of developing depth in balance with breadth. This is not a paradox and it can be done. A first step toward meeting this problem squarely is frank recognition of forestry as a member, a major member, of a larger team. If this step is taken then forestry takes its rightful place as an important part of a larger whole.

This same matter of viewpoint is, I think, at the bottom of much of the current controversy over which curicula should immediately qualify a graduate for membership in the Society. In the School of Natural Resources at the University of Michigan, for example, we offer and expect further to develop several that are not forestry by any stretch of imagination. Even if he were eligible, I see no reason to urge Society membership on a fisheries graduate aiming to do research on Great Lakes commercial fisheries problems, nor on a wood technology graduate intending to go into the furniture industry, nor a wildlife man interested in migratory birds. Yet all of these men have something in common in their basic education, some of them a good deal. We teach several courses aimed at preparing men for natural resource fields in general that we regard as valuable to foresters as to others. We have not and do not expect to sell forestry short in any way because we fully appreciate common interests in natural resources.

For these reasons, I cannot work up enthusiasm for urging all graduates of our school to join the Society, immediately on graduation, even if technical qualifications were broadened to admit them—which I would not favor. But I am enthusiastic about encouraging any of them later to enter the Society as full members if their work brings them into reasonable contact and identification with forestry interests and if they want to become a part of a dominantly forestry group. We need and want to maintain breadth of interest in the Society. Our present membership mechanics permit this in fairly full measure now though perhaps they could be more flexible and liberal.

With all respect, I would suggest that the Committee on Accrediting and the Council have employed some unhelpful semantics in using the words "unapproved curricula." The matter should be kept on a strictly positive basis. The question was and is which curricula taught at "forestry schools," and the term does not now mean what it once did, should initially qualify a man for Society membership. That and nothing else. Total requirements for Society membership are not involved. The fact that there are a good many other curricula offered at these schools as now organized is merely gratifying evidence of the growth of what was initially just "forestry." There is no need to label any of them as "unapproved"

because they do not meet the minimum educational requirements for a forester as currently defined. To affix the word merely gives opportunity for bad feelings and misunderstandings. Let's look forward to a bright future for forestry and other natural resources callings and exorcise from our usage the terms "specialized" or "approved" curricula in any sense of forestry *vs.* the rest.

KENNETH P. DAVIS,
Chairman, Department of Forestry
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On Forests and Men

Col. Greeley's new book[1] is one forestry teachers have been praying for. Being forced to use what is available for student references, they have had to assign collateral reading in some books that were definitely biased. *Forests and Men* is not biased in any respect. It is a clear-cut and sincere exposition of how forestry developed in the United States in the past 50 years. It is fair, frank, and firm. Where it is critical it is so without rancor. The story it presents is an American epic. It is told dramatically. The foreword by James Stevens is an unusually good introduction.

The author leaves no doubt in the reader's mind that he believes an approach to forestry through education, cooperation, and demonstration is superior to edict and force. He proves that where this approach has been followed, forestry has made progress. But he does not discount the influence of economic changes.

The book is free from the gloom that has characterized forestry literature since World War I. He sees much to crow about. Nevertheless he freely admits that what has been accomplished is merely a very good start. He wants the world to know the good side too.

Colonel Greeley is not a sideline writer. He was in the battles himself. He helped make much of the forestry history of which he writes. His style is fast moving, interesting, frequently humorous, and free from the minor details that are so deadening to the reader's interest. It is not a documented history. It does not have to be. He acknowledges use of some books, but likely only for important dates. Having made or been in on so much of the history of which he writes, his own candid presentation is sufficient.

Forests and Men is a book that should cheer and warm the souls and hearts of those Americans who are completely fed up with 30 years of diatribes, forebodings, and expositions of what is wrong with our American system of democracy and free enterprise. He proves that our system does work when given a chance. If other Greeleys keep forestry on the even keel that Colonel Bill put it on during its first 50 years, Americans will be able to point to an industrial accomplishment outranking all others. It is a great accomplishment already, particularly when one considers the handicaps, many of them man-made.

Forests and Men is a must for every forester's and lumberman's book shelf. It should be read at intervals. Particularly recommended for timberland owners is a reading and re-reading of Chapter X "Forest Industry is Settling Down" and Chapter XIII "Teachers or Policemen in the Woods." Having read these chapters, even the busiest reader will want to know what is in the others.

EMANUEL FRITZ.

[1]Greeley, Wm. B. Forest and men. Doubleday & Co., Garden City, N. Y. 1951.

Frequent Cuts in Farm Woods

That a forester of the eminence of H. H. Chapman[1] should question the advisability of "annual revenue from the woodlands" in the case of *farm* owners will make every farm forester pause and reflect. Such reflection is a healthy thing, but at the present time does not lead to any abrupt change in our thinking regarding Missouri hardwood farm forests.

It is axiomatic that foresters should advocate those practices which will insure the establishment, or regeneration, of the right trees on the right land. Where professional knowledge has been built up to the point that correct practices are known, adherence to them would seem to be expected of any forester.

The problems which a farm forester must solve are in two categories: *silvicultural* and *human*, with one of the more important aspects of the latter being economics. If we fail to solve the human problems which stem from the needs, prejudices, and the beliefs of the owner, it is obvious that we will never be called upon to help solve the silvicultural problems of that owner.

Most farms are certainly classifiable these days as a "going business," one of the best. In Missouri the woodlands on these farms are not in as healthy a condition as the rest of this rural money factory of cattle and crops. In the expanding, well-oiled operation of this farm enterprise, the 62 acres of run-down woods often appears not only a dead weight but also a dog in the manger. Its conversion to cultivation or pasture seems desirable to the farmer, and the expense involved is not the deterrent it once might have been.

The farm forester's biggest job is to keep the 62 acres in woods. (We shall assume, for the sake of simplicity, that good land use so dictates.) His next job is to improve the condition of the timber stand, and then to develop long range silvicultural plans to insure its perpetuation with the best possible species.

The value of annual cuts (or as near to annual as seems reasonable) is chiefly in helping to solve the human problems confronting the forester. This value is partly in the economic field, partly in the psychological.

The woodland is quite understocked, generally in all size groups, almost always in the volume producing sizes. More than a third of the trees over 12 inches d.b.h. are

[1]Chapman, H. H. Shall small woodlots be managed for sustained annual yield? Jour. Forestry, 49:343-344, May 1951.

unmarketable, sometimes useable at home, sometimes just cull. The farmer will not remove the entire volume of this material in one operation, generally. The best possibility is to persuade him to remove a bit each year as he has time or can utilize the low grade material, or make it marketable by labor investment. Advocating the use of poison for removal of defective overstory risks the serious possibility that the farmer will proceed to the other two-thirds of the stand and develop some "woods pasture."

The farmer has some slack time in the winter. It is about the most pleasant time to work in the woods. The material which he has to sell will bring him more per unit volume if he employs his own labor, will sometimes even just make a sale possible. He won't mind cutting a few thousand feet. He will balk at undertaking a 50,000-foot job. He's not used to woods work.

When he gets out there in the woods during these winter days, makes good wages, gets some material for home use, he begins to think perhaps he ought to keep that patch of timber. While he's cutting the trees the forester suggested that he harvest, he keeps his eyes open. He begins to see why they were suggested. The ones he's leaving are thrifty looking; easy to see that's the kind of growing stock to keep.

If the farmer harvests timber crops every 30 years he will hesitate at the wait, more money or not; he will tend to consider conversion of the land to other uses following a heavy cut—which makes it look an easier job to convert to those uses. He will not undertake the big cutting job himself but will sell on the stump to an operator. He will have no cause to go into the woods nor to observe the things the forester previously showed him, or talked about.

By encouraging farmers to work for short periods annually in the woods, we hope to teach them forest values and how to grow forest crops through participation; to get low grade material off the ground; to market their own labor. If this conflicts with the silvicultural problem of securing new growth of the most suitable species, we are professionaly obligated to stop. But does it?

The problems of a nonresident owner are quite different from those we deal with when working with farmers. A nonresident, regardless of how small his acreage, usually is best served by cuts which are as heavy and as infrequent as the silviculture of the stand allows.

On the other hand, excluding the harvest of veneer, stave, or walnut saw timber, the cutting in farm woodlots is concerned more with improvement and the salvage of material than it is with sustained yield as such. It is a conditioning operation, and it usually removes a large portion of the bigger trees in the stand which were high-graded before. To get this done often requires the farmer's doing it himself. To get the farmer to do it usually requires breaking the job into small doses.

The continuation of this light annual cutting into the period following the conditioning of the stand should be determined at the time the stand has been put into condition, and adjusted to the human problems presented by the owner at that time. Perhaps in many instances good silviculture will dictate heavy cuts. Is there any reason why heavy cutting cannot be carried on at short intervals by confinement to small areas? We do not understand the annual cut as requiring return to each acre annually.

We believe, here in Missouri, that the light annual cut or as near to it as is reasonable (naturally you have to have some acreage for application of it), is a definitely valuable tool for attempting the solution of the human problems involved in farm forestry work; and that with proper adaptation and modification to suit the circumstances there is no need to assume it contrary to the dictates of good silviculture.

ARTHUR B. MEYER,
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Being Practical in Small Woodland Management

The following statement is extracted from a letter received by H. H. Chapman from a reader of his article, "Should Small Woodlots be Managed for Sustained Annual Yield," which appeared on page 343 of the May 1951 JOURNAL OF FORESTRY.

Congratulations on your article in the May issue of the JOURNAL OF FORESTRY. Your analysis of the management problems a forester has to contend with while attempting to get a management plan on these small holdings hits the nail right on the head as far as I am concerned. Since 1933 I have been getting experience and an education in forestry; for the past two years I have been manager of this forest cooperative. In this area are examples of nearly every point you made in your article. I have been the object of some criticism from several of the governmental foresters because I have been directing the gyppos under the supervision of the co-op to cut in such a way as to obtain, for the owner, the same returns as he has been offered by independent gyppos, but keep a careful check that they do not ruin the future crop. This has been paying off in that the farmers and the loggers are buying this type of forestry.

In this same area one can see small woodlots where the owner has gone right down the line agreeing with the advocates of a theoretical thinning job only to find that he cannot find a logger who will cut it the way he wants it cut, or his returns will not be enough for his needs, or he does get a thinning cut made but still has enough merchantable timber left to interest a logger so that in a year or two he lets a logger in to cut the remaining merchantable timber and destroy the other 60 percent of his growing stock. What is the value of having a beautiful forest management plan if you don't get a chance to put it into effect?

Since coming on this job it has been brought home to me quite forcefully that we as foresters have to be able to show these small tim-

berland owners *better* results than they can get from a gyppo. This includes both the economic and the silvicultural phases of small woodland management. Some foresters have been confused into thinking that maximum yield and maximum dollar return are synonymous in these small woodlands. According to my experience, this is not necessarily true.

RICHARD F. SMITH, *Manager, Washington Forest Products Cooperative Association.*

Proper Classification of Land Essential to Wise Recreation Planning

In the June 1951 JOURNAL OF FORESTRY, J. V. K. Wagar[1] emphasizes the increase in recreation land use and discusses the problem of how to provide sufficient area to accommodate future expansion.

Ever since I secured the reservation of certain lake shores on the Chippewa National Forest in Minnesota, as the concession to recreation which enabled Congress to secure the passage of the Morris Law in 1902 and create this forest, I have been constantly endeavoring to emphasize a point which does not seem to have been brought out in this article.

It would seem fundamental that in appraising the amount and character of land required for recreational use, the location of natural use by the public should be a controlling factor, just as the density of traffic determines the plans for highways.

The Minnesota National Forest plan, afterwards adopted on the Superior National Forest and for highway strips and lake shores, is based on the proved fact that an overwhelming percentage of recreational use, anywhere and under any circumstances, is channeled along water fronts, roads, and trails, and does not penetrate more than the distance of visibility through the tree growth bordering these areas. The only exception is scenery and when viewed from points of access such as lookouts, mountain tops, or vistas, the character of the forest cover is not easily discernible, whether it is reproduction, old timber, or selective cutting.

On this sensible and practical basis, the need for setting aside large areas on which forestry is prohibited can only be justified under unusual circumstances, of which wilderness areas can be taken as an example, where these areas are mountainous (not, for example, in the Minnesota Roadless Area, which is comparatively flat). Any other policy constitutes a huge and comparatively useless waste of natural resources in timber and violates the fundamental principle of multiple use, which is to classify areas according to priority and obtain the greatest sum of benefits from the entire area.

This is where the policy of New York in the Adirondacks is wasteful and unnecessary despite intensive use and need for accommodating large numbers of recreationists. According to the official figures of the National Park Service,[2] the area intensively used for recreation in this park is 0.21 percent of the total state ownership. The same thing holds for the extended Olympic National Park, with its very much smaller public use.

It is the responsibility of professional men to analyze facts and arrive at sound conclusions independent of emotional appeals to "save" this or that great area, when the result could, with proper planning, guard and preserve forever completely adequate portions in forest, which would be (and has in Minnesota been) satisfactory to these 99 percent of recreation seekers.

In certain areas, immense numbers of people find what they want in very restricted areas. The areas in our Connecticut parks do not exceed 12,000 acres, yet the attendance figures run about 2,500,000 days per year. Where intensive use develops, as the result of creating ponds for swimming, or camping facilities, the area is blocked off from the state forest, given park status, and its management transferred to the park personnel. Only hunters, fishermen, and a few hikers make any use of the remaining forest area of 120,000 acres, on which forestry can be and is practiced. Yet this is one of the most densely populated states, with all public areas readily accessible.

If foresters are not on the alert to insist upon proper classification of land which should have exclusive priority for recreational uses, uninformed sentiment and emotion will have far too great an influence on public land policies, to the great detriment of public welfare, and with no commensurate gain in recreational benefits.

H. H. CHAPMAN.

[1] Wagar, J. V. K. Some major principles in recreation land use planning. Jour. Forestry 49:431-435, June 1951.

[2] State parks and related recreational areas. National Park Service, Branch of Lands. June 30, 1946.

Reviews

Chipped Wood Production and Uses.

135 pp. Illus. Northeastern Wood Utilization Council, Inc., New Haven, Conn. 1951. $2.

This is the published proceedings of a meeting held at Marlboro, Vt. September 15, 1950. It consists of papers and discussions.

Like all such publications, the information is not well coordinated and certainly not logically presented. The reader is left to do his own digging to get from the mass of data the particular information he may want. There is confusion about terms. One is not always sure whether the speaker, for example, is talking about a cord of chips or the chips from a cord. Most of the figures are in terms of tons of chips; one cord of wood is usually assumed to make two cords of chips in cubic measure, and one cord of chips weighs about one ton.

Chippers are described in great detail, both portable and stationary. With power units and trailor, they cost from $2,000 to $20,000. Capacities range from 2 to 20 cords of wood per hour. The smallest one will handle 8 cords per day or 1,600 cords per year. In a test run with a portable chipper, costs were figured to be $4 to $6 per ton of chips in the truck; of this, $2 was machine operation and the balance, wood cutting and handling; in terms of wood this would be about $8 to $12 per cord

Markets for chips for industrial uses are well established; they are used in making paper, linoleum, wall board, rugs, fuel. One instance is given of a paper company that chips its wood in the woods, but only for a use where bark is not objectionable.

Chips are entirely suitable for agricultural uses, such as bedding for cattle and poultry, mulch, and as organic matter to be added to the soil. Data are presented to show that for all these purposes chips of suitable sizes are not only satisfactory but superior to sawdust, shavings, straw, and green manure crops.

This market, if the chips could be made sufficiently cheap, would not only open a tremendous demand for chips, but would revolutionize agricultural practices. Needless to say, it also would greatly change the potential balance between the acres of farm woodland and the crop acres on farms. The tendency would be to have at least half the farm area in timber and, by using chips to keep up soil production, produce larger crops on much smaller acreages of open land at much less labor costs. The farm woodland would indeed then assume a new importance and foresters would be hard put to keep management of the woods on an even keel. Such a revolution, however, will not come until the costs of chips is considerably reduced below present estimates, or the benefits from their use are established by long trial to be greater than any research man would dare predict from present knowledge.

JOHN F. PRESTON,
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Soils of Wisconsin In Relation to Silviculture.

By S. A. Wilde, F. G. Wilson, and D. P. White. 171 pp. Illus. Wisconsin Conservation Department, Madison, Wis. 1949. $1.

This publication will be absorbing reading for all foresters. To the reviewer's generation of foresters it will be thrilling reading, "the shore dimly seen" of American silviculture. If I had been asked at the 50th anniversary of the Society of American Foresters last December for my most convincing reason to believe that our profession is "growing up," I would have named this bulletin.

Within its pages are described the soils, the lesser vegetation, and the forest—its composition, ecology, rate of growth, and silvicultural management for various purposes. This is not for a single woodland under intensive study, but for an entire state, diverse in soils if not in topography. That American foresters have accumulated sufficient knowledge to treat so vast a subject adequately is amazing and heartening proof that forestry on this continent is moving out of the stage of propaganda, administrative organization, and fire protection, into the stage of timber growing in all its phases.

The title *Soils of Wisconsin*, even with its subtitle *In Relation to Silviculture*, inadequately covers the subject matter presented in this bulletin. Soils are indeed treated with an apparent thoroughness and adequacy that altogether disqualify me as a reviewer. For the benefit of others whose ignorance of soils perhaps equals my own, let me say that the relatively simple text and the multitude of soil profile diagrams are a first-class introduction to the complexities of forest soils, their physical and chemical nature, and above all, their dynamics. But the authors' description of each important soil is only an essential preliminary to a scholarly list of the ground cover, the brushy species, and of course the tree species. The stages of succession in the virgin forest (or prairie) are indicated, and the ecological effect of such human interference as logging, man-made fires, and reckless agriculture. "Biological aspects" cover not only the fauna and flora of the soil, but the creatures, from rattlesnakes to deer, of the surface. Finally, silvicultural management is described not in generalities, but by specific measures. Particular attention is given to the problems of artificial regeneration, which in Wisconsin's "struggle with space" are grave indeed.

The scope of the author's consideration cannot be wholly conveyed by this brief listing of the items covered. It is suggested

also by their pause to describe at one point an easily eroded soil, and at another an erosion-resistant soil; their mention of some foresters' glib designation of burned-out peat lands as "wildlife areas," when such lands are nearly as barren of wildlife as of trees; their not-infrequent mention of esthetic values in forest or landscape. The latter item is reinforced by the charming and effective pencil drawings, presumably by Dr. Wilde, and the occasional quotation from Walt Whitman or William Cullen Bryant.

Unqualified admiration for the job as a whole need not prevent questioning of some specific statements. "The comparatively small total of silvicultural experiences in Wisconsin" has compelled the authors to draw on "information accumulated—abroad"; here and there the reader has an uncomfortable feeling that too great reliance has been put on such information, and that it might have been better to say: "Final word on this subject must await further study." The reviewer does not find very convincing the advocacy of a thinning from below in second-growth jack pine stands on melanized sandy soils. On the other hand, he views at least with interest the preservation of "some of the interspersed scrub oak" in such stands, "to improve the soil, increase the resistance of the stand to fire, and often to provide an environment suitable for the eventual invasion of pines." Light-burners, please note!

Dr. Wilde is professor of soils at the University of Wisconsin, and Mr. White, formerly of the U. S. Indian Service, was on his staff. Mr. Wilson is superintendent of cooperative forestry of the Wisconsin Conservation Department. The bulletin is described as "a collective effort," in which the U. S. Forest Service and the Civilian Conservation Corps joined with the university and the department. It is a monument to scientific cooperation of which foresters can be proud. Although forestry has dire need of writers as competent as the authors of this bulletin, it has even greater need of readers willing to get the utmost out of the written word. Three or four hours spent in really thoughtful perusal of *Soils of Wisconsin in Relation to Silviculture* will add appreciably to the professional stature of every North American forester.

R. D. FORBES.

Proposed Practices for Economic Analysis of River Basin Projects.

Report to the Federal Inter-Agency River Basin Committee prepared by the Subcommittee on Benefits and Costs. 85 pp. U. S. Govt. Print. Office, Washington, D. C. 1950.

This is one of those unnumbered federal publications which the ordinary forester stumbles upon only by chance. It is the report of a subcommittee appointed in 1946 by the Federal Inter-Agency River Basin Committee to formulate "mutually acceptable principles and procedures for determining benefits and costs for water resources projects." The primary purpose of the subcommittee, thus, was to standardize the procedures followed by various federal agencies which have river basin projects.

The basic theses of this report are (1) the justification for a river basin project must rest on a comparison of all the benefits resulting from the project with all the costs of carrying out the projects; (2) the most desirable scale of development is that at which the net benefits are a maximum; and (3) the project selected to accomplish a given purpose must be more economical than any other means which might have been used. This same reasoning might well be applied to any program for the development of our forest resources.

The subcommittee makes the point that "Benefit-cost analyses are not always the sole basis for approving or disapproving resource development projects." It suggests that foreign policy or national defense may outweigh the economic factors, but believes that even in such cases economic analysis should be used to determine the relative efficiency of possible projects.

The studies of the subcommittee consisted of (1) an analysis of current practices of agencies with river basin projects; (2) an objective analysis of fundamental economic principles and standards which could be used as a basis for economic analysis of such projects; and (3) the recommendation of a set of criteria for benefit-cost analyses.

The report was not written for the layman and even the lay forester will find it hard going in parts. However, the forester with an economic background and an interest in the optimum development of our forest resources will find a great deal of value in it.

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University of Georgia.

American Wildlife and Plants.

By Alexander C. Martin, Herbert S. Zim, and Arnold L. Nelson. 500 pp. Illus. McGraw-Hill Book Company, New York. 1951. $7.50.

This book supplies a long-felt need for a comprehensive reference on wildlife food habits. It brings together in one place the accumulated data on food habits studies made by the U. S. Fish and Wildlife Service since 1885.

Part I is quite short and is composed of 4 chapters. These include a very interesting discussion of the relationships between animals and plants, general observations on food habits studies, a chapter on farm crops and wildlife, and a necessary chapter on the interpretation of symbols and other abbreviations used in the book.

The major portion of the book is devoted to Parts II and III which are about equal in length. Part II considers food habits from the standpoint of the animals. For each of a host of animal species there is information on the range of the species, kinds of animal foods eaten, relative percentages of plant or animal foods taken during different seasons, and a list

of the plant foods taken classified as to species, percentage of diet, and seasons of use. In addition, data are furnished on the number of animal specimens studied by seasons and the geographical region specimens were taken in. While this book is primarily concerned with the food habits of mammals and birds, Part II includes a short chapter on the general food preferences of fish, amphibians, and reptiles.

Part III approaches the subject from the standpoint of plants. Here each section is devoted to a plant genera or species and its value to wildlife is discussed in detail. Among the many factors considered are the range of the plant and its percentage in the diet of various animal species. Line drawings of the plants and the parts used are frequent and very effective. Effective use is also made of maps showing plant ranges, region of principal use, and numbers of plant species by geographical regions. Part III concludes with a practical chapter which ranks wildlife plants according to their relative value to several different groups of animals.

Not only will wildlife researchers welcome this book as a valuable time saver in checking on food habits data, but the wildlife administrator as well will have considerable use for it in his day-to-day work. The forester, too, will find much information of use to him. The amount of material on the use of woody plants by different animal species is extensive. Those species which may do damage to trees are pointed out as well as those which may be beneficial. The data on plants that are subject to damage by certain forms of wildlife may be helpful to the forester in management planning.

Not the least contribution that this book offers to improve the forester's knowledge is a better understanding of the close interrelationships between wildlife and forests. Though we foresters have begun to appreciate these interrelationships more in recent years there are still too many of us who are inclined to give them but little consideration.

Condensing such a tremendous amount of information into a book of 500 pages was obviously a difficult task. To accomplish this, the authors make liberal use of abbreviations and symbols. As a space saving device this is completely justifiable though some readers may demur at the amount of study necessary to understand their use.

The authors recognize that in some instances the samples available were too small adequately to satisfy statistical requirements. This, however, is insufficient reason to delay the publishing of this excellent and badly needed reference book. If intelligently used, even incomplete data add to present knowledge and in addition point the way to needed research.

MERLE A. GEE,
U. S. Forest Service.

Practice of Wildlife Conservation. By Leonard W. Wing. 412 pp. Illus. John Wiley & Sons, Inc., New York. 1951. $5.50.

Too few textbooks exist on the subject of wildlife management, though voluminous literature may be found on various phases of the subject. Dr. Wing has done a first-class job in gathering together basic information so necessary to the new man or an old one who needs an occasional crutch.

In establishing the basis for wildlife management, Wing has written an excellent chapter on "The Biological Base of Management"; subjects have been treated fully and without creating additional terminology in an already overburdened vocabulary.

The regional and habitat grouping of wildlife will find ready endorsement by those using the text as reference. Wing's modern philosophy of tieing wildlife management into land use is illustrated in the statement, "Silvicultural practices that are good for wildlife are usually good forestry; silvicultural practices that are harmful to wildlife are often poor forestry." It would have been appropriate to have expanded further this same philosophy under "Farm Game and its Management."

The inclusion of chapters dealing with wildfowl management in a text of general wildlife management is refreshing and certainly will find ready endorsement from technicians. I was disappointed in reading this important portion of the text to note that improvement of emergent waterfowl habitat was touched on but lightly. In this age of river control and hydro-electric development the future of waterfowl rests in a large measure on the ability of the wildlife manager to exploit feeding ranges provided by fluctuating reservoirs, eliminating worthless plant associations in favor of valuable waterfowl food plants.

The subject matter covered in the chapters dealing with the legal status of wildlife, state powers, migratory bird treaties, and conservation agencies has long been needed in a general wildlife text. The treatment of this information is sufficient to provide basic knowledge to the new entrant in the field of wildlife management.

My greatest criticism of the text is that though it is excellent so far as it goes, in dealing with management practices of the several species, Wing stops short of sufficient detail to provide operational information, without considerable additional reading in the suggestions following each chapter. The author points out his reasons for this in the preface; nevertheless, further detail would be appreciated by those using the text for reference purposes.

In reviewing the suggested reading material following each chapter I found that several rather important publications were omitted, for example, on pages 247-248, I would suggest that O'Neils' *Muskrat in Louisiana* be added; on page 296, I would include Haig-Brown's *Western Angler*.

To Table 20.2, page 315, "Rare and Threatened Species" (North America), should be added the limpkin, roseate spoonbill, and key deer.

The text is remarkably free of errors; however, one typographical error is apparent on page 344, that I could not help but see. The present director of the U. S. Fish and Wildlife Service is Albert M. Day.

As a general text on the practice of wildlife conservation, Wing's book cannot be rated other than first class.

HOWARD A. MILLER,
U. S. Fish and Wildlife Service.

Reproduction on Cut-Over and Burned-Over Land in Canada.

By R. H. Candy. 224 pp. Illus. Department of Resources and Development, Ottawa, Ont., Canada. 1951.

Although this report does not touch on British Columbia with its complex forest conditions, it covers a tremendous range of territory from Newfoundland to the eastern slope of the Rockies in Alberta. Mainly it is a report on spruce and balsam regeneration. In only one district examined are white and red pine of primary importance. Jack pine types (lodgepole pine on the east slope of the Rockies) appear in all provinces but in general are of secondary importance. Hardwoods are mainly poplar and white birch and of interest mainly as competitors of the softwood species.

Stocking percentages are given for areas cut-over only, burned only, and both cut-over and burned. The last class shows uniformly poor regeneration, and the second class good regeneration only in some of the jack and lodgepole pine types. From Lake Superior to the Atlantic Coast, regeneration of spruce and balsam on areas logged only is stated to be most encouraging. Much of this is advance growth and is most abundant in rather old stands which have begun to open up. Stands composed of trees forming the first generation following a fire in which the intolerant hardwoods are still intact do not have as much advance growth nor as favorable conditions for establishment of new seedlings. In such stands the proportion of mixed types is higher and stocking percentages much lower than in pure softwood stands.

Summary figures for large areas as given in this bulletin must of necessity fail to show clearly the proportion of the total area in which regeneration is unsatisfactory. General statements that in certain large regions regeneration is encouraging may lead some to the conclusion that no special efforts to secure regeneration are anywhere necessary in such regions, whereas it would be obvious on detailed examination that many areas would require such efforts. Nevertheless, it appears clear that regrowth of spruce and balsam after logging will be much more satisfactory than was the case on the areas logged for white pine in the past hundred years. This is explained by the fact that spruce is the dominant species of a climax forest whereas white pine originated almost entirely from fires burning virgin stands and did not regenerate readily after logging.

West of Lake Superior reproduction is shown to be much less abundant than in the east, due to drier conditions. It is an anomolous situation that the section of the continent where the finest white spruce grows should be a region where its regeneration is difficult.

T. W. DWIGHT,
University of Toronto.

Green Harvest.

55 pp. Illus. Brown Company, Berlin, New Hampshire. 1951. Free.

While primarily a story of pulpwood production in so far as a specific company is concerned, this booklet will be of general interest to both layman and forester.

There are two parts. The first part deals with pulpwood and its manufacture and also includes a description of the various mills of the Brown Company and the products manufactured by them.

The second part contains a well written description of pulpwood and the forest. It presents a nontechnical description of the various operations necessary to procure the 400,000 cords of pulpwood annually required by the company. Starting with the cutting plans for future mill usage and ending with the actual delivery of the pulpwood at the mills, the various stages of planning and pulpwood production are described. There are numerous well-chosen illustrations.

Several pages are devoted to forest management on woodlots. This information, designed to impress the small woodlot owner with the importance of keeping his land in a good growing condition, is "good medicine." Any wood using industry which depends upon small woodlots for part of its supply of raw material cannot help but have an active interest in keeping these lands productive.

Direct assistance is given to private timberland owners and producers of pulpwood by providing trained foresters to look over woodlots. These men make practical recommendations for operating the area and also suggest measures to keep the land productive. Pulpwood producers who deal with the company are also furnished with free seedlings for spring planting.

With the distribution of this booklet another large pulp and paper company has made public the fact that it is engaged in an active forestry program.

GEORGE STENZEL,
University of Washington.

Current Literature

Compiled by MARTHA MEELIG, *Librarian, The New York State College of Forestry*

Range Management Section Compiled by FRANCES FLICK, *Library, U. S. Department of Agriculture*

General

The Arboreal Flora of Israel and Transjordan and Its Ecological and Phytogeographical Significance. By M. Zohary. 59 pp. Imperial Forestry Inst., Univ. of Oxford. Inst. Paper No. 26. 1951. 5s od.

Asia and Pacific Forestry and Forest Products Bibliography Up to 1 January 1950. 155 pp. FAO of the United Nations, Bangkok, Thailand. 1951. Mimeog.

Forty Years of Forest Research in the Northern Rocky Mountain Region; . . . Annual Report. 62 pp. Illus. Missoula, Mont. 1951. Mimeog.

The National Parks: What They Mean to You and Me. By Freeman Tilden. 464 pp. Illus. Alfred A. Knopf, Inc., New York 22. 1951. $5.

State Trees. 4 pp. Rev. 1951 by U. S. Forest Service, Washington 25, D. C.

Steve Mather of the National Parks; A Biography. By Robert Shankland. 360 pp. Illus. Alfred A. Knopf, Inc. New York 22. 1951. $4.

Farm Forestry

Volume and Growth of Farm Woodlands in Centre County, Pennsylvania. By W. G. Keller and H. A. Meyer. 4 pp. Pennsylvania State Forest School, State College. Research Paper No. 13. 1951.

Forest Influences

A Water Policy for the American People; Summary of Recommendations from the Report of the President's Water Resources Policy Commission. 18 pp. Illus. 1950. 15 cents (Govt. Print. Off.) The Report is issued in three volumes—Vol. 1 General Report, $3.25; Vol. 2 Ten Rivers in America's Future, $6. (Separate river reports also available.) Vol. 3 Water Resources Law, $2.25.

Forest Management

Use of Low-Altitude Continuous-Strip Aerial Photography in Forestry. By A. L. Mignery. 19 pp. Southern Forest Expt. Sta., New Orleans, La. Occasional Paper No. 118. 1951.

Forest Resources

Forest Statistics for Eastern Tennessee; A Report of the Southern Forest Survey. 25 pp. Southern Forest Expt. Sta., New Orleans, La. Forest Surv. Release No. 66. 1951.

Forest Statistics for New York Forest District No. 1. By J. R. McGuire and R. D. Wray. 21 pp. Northeastern Forest Expt. Sta., Upper Darby, Pa. Forest Stat. Ser. N. Y. No. 1. 1951.

Land Use

Uncle Sam's Acres. By Marion Clawson. 414 pp. Illus. Dodd, Mead Co., New York 16. 1951. $5.

Logging and Milling

Four Test-Demonstrations of Hardwood Log Grades in the Northeast. By G. E. Doverspike and H. W. Camp, Jr. 19 pp. Northeastern Forest Expt. Sta., Upper Darby, Pa. Sta. Paper No. 42. 1951.

The Lumber Industry, 1948. Dominion Bur. of Statistics, Ottawa, Canada. 18 pp. 1950. 35 cents.

Protection

European Pine Shoot Moth Attacks Red Pine Plantations. By E. H. Tryon. 11 pp. Illus. West Virginia Univ. Agric. Expt. Sta., Morgantown. M. Cir. No. 67. 1951.

Range Management

Cowboys and Cattle Kings; Life on the Range Today. By C. L. Sonnichsen. 316 pp. Illus. Univ. of Oklahoma Press, Norman. 1950. $4.50.

Crested Wheatgrass Grazing Values. By E. J. Woolfolk. 10 pp. Illus. U. S. Forest Serv., Northern Rocky Mtn. Forest & Range Expt. Sta., Missoula, Mont. Research Note No. 91. March 1951. Mimeog.

Fertility Studies in Setaria sphacelata. By P. J. Gildenhuys. 45 pp. Illus. Union of South Africa Dept. of Agric., Pretoria. Science Bul. No. 314. 1950. 6d.

Forage Species and Seasons for Reseeding Foothill Range Lands in Northeastern Washington. By E. J. Woolfolk and G. A. Harris. 2 pp. U. S. Forest Service, Northern Rocky Mtn. Forest & Range Expt. Sta., Missoula, Mont. Research Note No. 97. April 1951. Mimeog.

Guide for Reseeding Summer Rangelands on Colorado's Western Slope. By C. W. Doran. 18 pp. Illus. U. S. Forest Serv., Rocky Mtn. Forest & Range Expt. Sta., Ft. Collins, Colo. Sta. Paper No. 6. April 1951.

Managing Northern Great Plains Cattle Ranges to Minimize Effects of Drought. By L. C. Hurtt. 24 pp. Illus. U. S. Dept. of Agric., Washington 25, D. C. Cir. No. 865. March 1951. 10 cents. (Govt. Printing Off.).

Vegetation of Southwestern Watersheds in the Nineteenth Century. By L. B. Leopold. Geographical Review, Broadway & 156th St., New York 32. Vol. 41, pp. 295-316. April 1951.

Silviculture

Growth and Yields from a Fifty-Year-Old White Pine Plantation. By H. A. Stoehr. Pp. 426-36. Illus. Reprint from Michigan Agric. Expt. Sta. Quarterly Bul. Vol. 33, no. 4. May 1951.

Natural Regeneration of Lodgepole Pine on Seedbeds Created by Clear-Cutting and Slash Disposal. By K. N. Boe. Northern Rocky Mtn. Forest & Range Expt. Sta., Missoula, Mont. Research Note No. 99. 1951.

Waldbau. By Joseph Köstler. 418 pp. Illus. Paul Parey, Berlin. 1950.

Zaaien in de Bosbouw (Sowing in Forestry). By H. van Vloten. Pp. 59-65. Illus. Nederlandse Bosbouwproefstation T. N. O., Wageningen. Reprint from Yearbook 1948-1949. Korte Med. No. 8. 1950.

Soil Conservation

Land Capability Methods for Conserving Washington Soils. By W. A. Starr and L. C. Wheeting. 40 pp. Illus. Inst. of Agric. Sciences, State College of Washington, Pullman. Popular Bul. No. 200. December 1950.

Soils

De Productiecapaciteit van de Zandige Bruine Bosgronden (The Production Capacity of Sandy Brown Forest Soils). By C. P. van Goor. 31 pp. Nederlandse Bosbouwproefstation T. N. O., Wageningen. Kort. Med. No. 9. 1951.

Root-Rot Control and Soil Improvement at the Ashe Forest Nursery. By T. E. Maki and B. W. Henry. Southern Forest Expt. Sta., New Orleans, La. Occasional Paper No. 119. 1951.

Wildlife Management

American Wildlife and Plants. By A. C. Martin, H. S. Zim and A. L. Nelson. 492 pp. Illus. McGraw-Hill Book Co., New York 18. 1951. $7.50.

Arizona and Its Bird Life. By Herbert Brandt. 800 pp. Illus. The Bird Research Foundation, 2425 North Park Blvd., Cleveland 6, Ohio. 1951. $15.

Wood Technology and Utilization

The Existence of a Uronic Acid Ester in Young Wood of Eucalyptus Regnans. By D. H. Foster, Gerda Schwerin, and W. E. Cohen. Pp. 504-511. Commonwealth Science and Industrial Research Organization, Melbourne, Australia. Reprinted from Aust. Jour. Sci. Res., Vol. 3, no. 3. Div. For. Prod. Reprint No. 127A. 1950.

The Mechanical Properties of Red Tulip Oak Argyrodendron Peralatum (Bail.) C. T. White. 53 pp. Commonwealth Science and Industrial Research Organization, Melbourne, Australia. Reprinted from Aust. Jour. of Applied Sci., Vol. 1, no. 1. Div. For. Prod. Reprint No. 112. 1950.

Wood Structure in Relation to Growth in Eucalyptus Gigantea Hook. F. By G. L. Amos, I. J. W. Bisset and H. E. Dadswell. Pp. 393-413. Illus. Commonwealth Science and Industrial Research Organization, Melbourne, Australia. Reprinted from Aust. Jour. Sci. Res., Vol. 3, no. 4. Div. For. Prod. Reprint No. 130. 1950.

Wood-Using Industries, 1948. Dominion Bur. of Statistics, Ottawa. 17 pp. 1950. 35 cents.

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Connaughton Outlines Plans for S.A.F. Meeting

Plans for all phases of the Society's forthcoming annual meeting are progressing on schedule, according to Charles A. Connaughton, general chairman of the meeting. The Buena Vista Hotel, Biloxi, Miss., is the headquarters for the meeting. Optional activities in connection with the annual convention of professional foresters extend from December 11 through December 15, 1951 with general and Division sessions on the last three days.

Dr. Connaughton anticipates an attendance of 1,000 Society members and guests. Student Members will not be required to pay the registration fee of $2 assessed others. Registration fees will be used to meet general meeting expenses. Host for the convention is the Gulf States Section.

Opening with a general session at 9:30 a.m. on Thursday, December 13, the meeting will conclude with a final general session on Saturday morning, December 15. President Charles F. Evans of Atlanta, Ga. will preside at both general sessions.

Pre-meeting activities include an optional all-day field trip on Tuesday, December 11, in the vicinity of Bogalusa, La., a half-day field trip near Biloxi on Wednesday morning, December 12, and another on Saturday afternoon, December 15.

The Division of Education will hold both 9 a.m. and 2 p.m. sessions on Wednesday, December 12. The Society's ten other professional Divisions have planned technical sessions on Friday, December 14. Major emphasis will be given in all-day sessions to the new Division of Forest Management and the Division of Silviculture. Other Divisions meeting on Friday are Private Forestry, Forest Products, Forest Economics, Forest Recreation, Watershed Protection, Forest-Wildlife Management, Range Management, Forestry Education, and Public Relations.

The Society's annual dinner will be at 7:30 p.m. on Friday, December 14. Charles F. Flory, former member of the Council and state forester of South Carolina, will be the toastmaster. The featured speaker will be Justin Wilson, a Cajun humorist from Baton Rouge, La. The dinner, featuring seafood for which the Gulf Coast is famous, will be entirely informal. (Sports wear or business attire.)

An important issue confronting the Society, that of determining the rules of eligibility for prospective Junior Members, will be the principal subject for discussion from the floor at the Society Affairs session on Thursday afternoon, December 13. Reports of the Society's committees also will be presented at that time.

Thursday evening has been reserved for meetings of alumni groups and similar gatherings. The Gulf States Section is host on Wednesday at a hospitality open-house featuring seafood served buffet style.

Official delegates of the Society's 21 Sections will meet at 10:30 a.m. on Wednesday, December 12, and will meet jointly with the Council at 2 p.m. that afternoon. The Council also plans a joint meeting with Division officers.

Business to be transacted by the Council at its sessions on Wednesday morning and Wednesday evening includes the selection of a full-time editor of the JOURNAL OF FORESTRY.

Come to the South

The fifty-first annual meeting of the Society of American Foresters will provide an opportunity for foresters to visit the South where trees grow fast and forestry is on the march. The dates are December 12-15, 1951; the place, Biloxi, Miss. Come see the forests which now supply half the nation's paper industry, forty percent of the nation's lumber industry, all its naval stores industry, and many other wood-using industries. Moreover, the weather will be sunny along the Gulf Coast in December, we hope!

Southern forestry has much of interest to reward the visitors. Great strides have been made since the pioneers—Austin Cary, H. H. Chapman, W. L. Hall, I. F. Eldredge, W. W. Ashe, J. S. Holmes, E. O. Siecke, and others—literally preached the gospel in the wilderness. Fire control was a first problem. At the turn of the century, the South was scorched with fire from Kitty Hawk to Alamo. Millions of acres burned over each year. Other millions of acres burned at more or less frequent intervals. It was rare indeed to find even a forty-acre tract that had unscorched trees. But today, 137 million acres of forest land out of 185 million are under organized protection. The South is on its way to region-wide protection within a very few years. The fire problem is by no means solved, but progress is being made. Among the interesting angles of fire problems are the question of prescribed burning; the role of fire in disease control; the value of hazard reduction as insurance; the effect of fire on hidden soil and water values; advance in mechanized forest fire control; backfire torches, pumps, tractors, heavy trucks, and radio; and the varied public relations issues involved.

Good forest management is spreading. Millions of acres owned by hundreds of individual companies and by public agencies are under sustained-yield management. Almost every broad forest type has many examples of good management. Some ownerships have been under management for as much as twenty years. A few have a history of rudimentary management going back thirty years or more.

Foresters will be especially interested in natural regeneration of longleaf pine with the use of prescribed burning over thousands of acres; the encroachment of less desirable hardwoods into millions of acres capable of growing pine; the threat of littleleaf disease and cronartium; regeneration of loblolly pine in even-aged or mixed stands; place of grazing on southern forest land; and so on through a host of problems in a region where rapid growth permits many answers within less than life time.

The results of planting are of interest. There are well over a million acres already planted. They range from individual farm plantings of a few acres to private and public efforts exceeding 50,000 acres within a limited area. While planting in the South made its start about thirty years ago, the greater part of it has been done since 1930. Even so, there are many plantations where owners have harvested profitable crops of pulpwood, naval stores, poles, and saw logs.

For the more scientifically minded visitors, there are a number of research centers operated by private companies, forestry schools, and the U. S. Forest Service. The hydrological station at Coweeta, N. C., the only one of its kind in the South, is devoted to the study of forest influences. Foresters can learn just what happens to water throughout its cycle of condensation into rain, evaporation, transpiration, storage, and run-off, and how the water resource can be managed.

An interesting example of industrial research in forest management is located on the experimental forest of the West Virginia Pulp and Paper Company at Georgetown, S. C.

The Naval Stores Station at Lake City, Fla., is working on forest management for naval stores, including use of acid for gum stimulation, the selection and cross-breeding of high yielding strains, and bark chipping. There, too, is the Naval Stores Re-

search Laboratory of the Bureau of Chemistry and Soils, where new techniques in distilling are being developed.

The latest techniques in pulpwood and timber logging, utilization, and processing may be seen in southern woods and mills. Among the interesting developments are the new methods of mechanical handling of pulpwood at Georgetown and elsewhere, and the new process in the manufacture of dissolving pulp for the rayon industry.

The well-known Crossett Experimental Forest at Crossett, Ark. provides fascinating research results in pine management. It should not be missed.

While the South has no monopoly on progress in technical forestry in woods or mill, it does have some of the best in any field. Here developments are certain to prove of interest to any forester who attends the annual meeting. It is not possible in this brief message to do more than suggest some of the things to look for and a few places where to look.

As a further assistance to visiting foresters, the Publicity Committee is developing a map with some five hundred points of interest including management areas, progressive plants, experimental centers, state and federal forests, and forestry schools. The map will be something every forester will want, whether he comes to the meeting this year or visits the South at some later date. An announcement will appear in the JOURNAL when it is available.

W. R. HINE, *Chairman,*
Publicity Committee,
1951 Annual Meeting.

How to Make Hotel Reservations for the Annual Meeting

Biloxi, Miss., December 12-15, 1951

A special Society committee will receive requests for hotel reservations, which will be filled in the order of their receipt. The Society will not be responsible for failure to obtain rooms by those making reservations direct with hotels.

The reservation coupon below is for your convenience in requesting your hotel room. Please send your request to the committee to avoid delay and confusion. Room assignments will be made promptly, and you will receive a confirmation in two weeks or less.

A member who desires to make a reservation without tearing this page from the JOURNAL may do so simply by supplying the pertinent information in a letter addressed to the committee.

The Buena Vista Hotel is the headquarters for the meeting. However, because of the expected large attendance, the Buena Vista cannot accommodate all members. Consequently, other hotels in Biloxi and along the Gulf Coast will cooperate in housing members.

To the extent possible, members travelling to Biloxi by train or other common carrier will be housed in the headquarters hotel. Those who will have their own automobiles may be housed in nearby hotels.

Listed below are the hotels which are cooperating for this meeting. All are on the beach and face the Gulf. All rates quoted are for rooms with bath. In addition, rooms with connecting bath are available at some hotels. Certain hotels provide rooms with three and four beds and bath. A limited number of such rooms is available.

Please plan to share a room. An ample number of twin-bed rooms is available. Teaming-up will result in more economical rates.

Make your reservation request early to secure your first choice of desired accommodations. The reservations committee will try to provide accommodations at the rate desired, but in case accommodations are not available at the exact rate specified, the next nearest rate will apply.

Buena Vista Hotel

The Buena Vista Hotel is on West Beach Boulevard, (U. S. Route 90) in Biloxi. The European plan rates are as follows: single, $3.50, $4, $4.50, $5, $6.50, and $7.50; for two persons (twin beds), $6.50, $7, $7.50, $8.50, $10, and $12.50. Suites with parlor: single, $10, $12.50, and $17.50; for two persons $15, $17.50, and $22.50.

All rooms have private bath except those for $3.50 single and $6.50 double, which have a bath between two bedrooms. The charge for a third adult in a room is $2.50, and for a fourth adult $2; for children under 12 years of age sharing a room with an adult, $1.50.

Several pleasant cottages, both at the Buena Vista Hotel and the White House, are available at rates of $6 to $12 for two to four persons. Those desiring cottages should inquire direct to the Buena Vista for Rates.

Other Hotels

Rates at the other hotels vary from,

Hotel Reservations Committee
Society of American Foresters
Buena Vista Hotel
Biloxi, Mississippi.

....., 1951
(Date)

Please reserve the following room accommodations for arrival on December ..... a.m.
ber ....., p.m. Departure date, December ..... I understand that accommodations will be provided at the rate desired, if available; otherwise the next nearest rate will apply.

..... Single room with bath. Rate $ .....
..... Double-bed room with bath. Rate $ .....
..... Twin-bed room with bath. Rate $ .....
..... Room with 3 beds and bath. Rate $ .....
..... Room with 4 beds and bath. Rate $ .....
..... Two bedrooms with bath between. Rate $ ..... per room.
..... Suite (parlor, twin-bed room, and bath). Rate $ .....
..... Other (specify accommodations wanted). .....
..... Rate $ .....
..... Tourist court (specify accommodations wanted). .....
..... Rate $ .....
..... I expect to travel by automobile. (Not to be checked by those who will use other kinds of transportation.)

The above room accommodations are requested for the following persons, in addition to myself. (Please type or print legibly.)

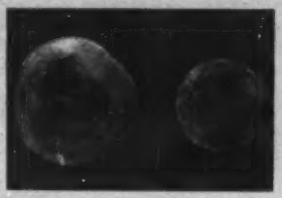
..... (Name) ..... (Address)
..... (Name) ..... (Address)
..... (Name) ..... (Address)
..... (Name) ..... (Address)

..... (My name)
..... (Street address)
..... (City) ..... (Zone) ..... (State)

HERE'S PROOF *that* OSMOSE TREATED LUMBER *Lasts Longer*

The board at the left is a piece of Osmose treated Lumber and was subjected to severe exposure tests. Upon examination it was found to be strong and healthy, unaffected by fungi or wood destroying insects.

This piece of ordinary, untreated lumber was subjected to identical exposure tests and the difference in appearance speaks for itself. This board had lost most of its natural strength, crumbled in the hand and was practically consumed by pests that habitually attack unprotected wood.



The light areas in these cross sections from Osmose treated posts graphically portray the deep penetration of the toxic salts. Small dark areas deep in the center of the wood are only spots not fully protected.

Here's what happens when you build with untreated lumber that is subjected to moisture. This porch built directly on the ground would have lasted 3 to 5 times longer if it had been constructed of Osmose treated Lumber.

★ **WON'T ROT!**
★ **REPELS TERMITES!**
★ **LASTS 3 TO 5 TIMES LONGER!**

Men who know lumber also know that lumber doesn't just wear out . . . it is literally "eaten up" by fungi and hordes of wood destroying insects. However, Osmose treated Lumber stops these pests cold! Osmose treated Lumber is ordinary lumber that has been treated with Osmosalts (a highly toxic chemical mixture) that makes it resistant to decay and termites.

Naturally, the user pays a small premium for Osmose treated Lumber, but when you consider that it lasts 3 to 5 times longer, is fire retardant and NEED NOT BE PAINTED, the use of untreated lumber appears impractical indeed. Osmose treated Lumber, unpainted, is ideal for modern ranch-type houses, cottages, barns, outbuildings, bridges and all types of industrial construction. If you prefer, Osmose treated Lumber can easily be painted and the green treatment color acts as a base coat, thereby saving on paint.

Everything we say about Osmose treated Lumber has been proven over and over again during the past 15 years by our users as well as the Federal Government who have made exhaustive tests. Proof of these service tests is on file and you may have copies by writing to our headquarters. Osmose treated Lumber is sold through Authorized Producers whose operations are supervised and directed by graduate foresters trained specially by the OSMOSE WOOD PRESERVING CO. OF AMERICA, INC., 1437 BAILEY AVE., BUFFALO 12, N. Y.

OSMOSE TREATED LUMBER

single, $3 to $8; and for two persons from $6 to $10.

The other cooperating hotels are the following:

Hotel Biloxi, Biloxi; 0.8 mile west of the Buena Vista Hotel on U.S. 90.

White House and Cottages, Biloxi; 1 mile west of the Buena Vista Hotel on U.S. 90.

Edgewater Gulf Hotel, Edgewater Park, Miss.; 6 miles west of the Buena Vista Hotel on U.S. 90.

Hotel Riviera, Biloxi; 0.4 mile east of the Buena Vista Hotel, on U.S. 90.

Hotel Tivoli, Biloxi; 1.2 miles east of the Buena Vista on U.S. 90.

In addition there are numerous good tourist courts in and about Biloxi with rates scaled according to the kind of accommodations desired. Generally, these rates are slightly lower than those for the hotels listed. The Hotel Reservations Committee will make reservations for tourist court rooms also.

President and Council Candidates Listed

October 8, 1951 is the deadline for filing nominations in the Society's biennial election which concludes December 1, 1951. A president, vice president, and nine other Council members will be elected to serve during 1952 and 1953.

Candidates already nominated are listed below. The names of candidates for whom petitions were filed since publication of the August JOURNAL are printed in bold-faced type.

For President

Elwood L. Demmon, Southeastern Forest and Range Experiment Station, Asheville, N. C. (Appalachian Section.)

Stanley G. Fontanna, School of Natural Resources, University of Michigan, Ann Arbor, Mich. (Central States Section.)

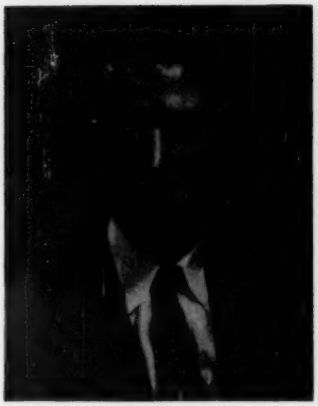
DeWitt Nelson, Division of Forestry, Department of Natural Resources, Sacramento 14, Calif. (Northern California Section.)

For Member of the Council

Dwight B. Demeritt, Dead River Company, 6 State Street, Bangor, Me. (New England Section.)

D. E. Hess, Glatfelter Pulpwood Co., Murphy Building, Gettysburg, Pa. (Allegheny Section.)

Walter H. Horning, Bureau of Land Management, U. S. Department of the Interior, Washington 25, D. C. (Washington Section.)



ELWOOD L. DEMMON

Elwood L. Demmon, director of the Southeastern Forest and Range Experiment Station, Asheville, N. C. has been nominated for election as president of the Society. A member of the Council in 1933 and 1934, Mr. Demmon is currently serving as the Society's representative to the Division of Biology and Agriculture of the National Research Council.

Frank H. Kaufert, School of Forestry, University of Minnesota, St. Paul, Minn. (Upper Mississippi Valley Section.)

C. Otto Lindh, U. S. Forest Service, Post Office Building, Albuquerque, N. M. (Southwestern Section.)

Gordon D. Marckworth, College of Forestry, University of Washington, Seattle, Wash. (Puget Sound Section.)

R. Vance Miles, Gulf States Paper Corporation, Tuscaloosa, Ala. (Southeastern Section.)

George R. Phillips, Office of the Secretary, U. S. Department of Agriculture, Washington 25, D. C. (Washington Section.)

Earl Porter, Southern Kraft Division, International Paper Company, Mobile 9, Ala. (Gulf States Section.)

Council Candidates

D. E. HESS

D. E. Hess, vice president of the Glatfelter Pulpwood Co., Murphy Building, Gettysburg, Pa. is a candidate for election to the Council. He is the vice chairman of the Allegheny Section.

FRANK H. KAUFERT

Frank H. Kaufert, director of the School of Forestry at the University of Minnesota, St. Paul, Minn. is a candidate for reelection to the Council. He is currently serving as a member of the Council Committee on Membership.

R. VANCE MILES

R. Vance Miles, manager of the Gulf States Paper Corporation's division of forestry, Tuscaloosa, Ala., has been nominated for consideration as a member of the Council. He is a former officer of the Southeastern Section and former chairman of the Society's Committee on Licensing.

Perry A. Thompson, 12 Elkin Court, San Rafael, Calif. (Northern California Section.)

Ralph H. Westveld, Department of Forestry, University of Missouri, Columbia, Mo. (Ozark Section.)

Robert K. Winters, Central States Forest Experiment Station, Old Federal Building, Columbus 15, Ohio. (Central States Section.)

Any ten voting members may sign a petition such as the following to nominate a Member or Fellow for consideration.

We, the ten or more undersigned voting members of the Society of American Foresters, hereby nominate ..... to serve as (member of the Council) (president) during 1952 and 1953.

Outstanding Foresters Nominated as Fellows

Election as a Fellow of the Society of American Foresters denotes recognition of outstanding achievements in the forestry profession.

Candidates for election to that grade are nominated by petitions bearing the signatures of 25 or more Members or Fellows. Junior Members, as well as non-voting members, are not permitted to sign petitions to nominate Fellow candidates.

To be valid, petitions with accompanying 200-word factual statements must be received in the Society office by October 8, 1951. Election is on December 1, 1951 by current Council members and Fellows. See the June JOURNAL for further details.

Fellow candidates nominated thus far are listed below. The names of persons nominated since the August JOURNAL was published are shown in bold-faced type.

Fellow Nominees

Hugh Curran, Caracas, Venezuela.
Walter J. Damtoft, Canton, North Carolina.
Elwood L. Demmon, Asheville, North Carolina.
Emanuel Fritz, Berkeley, California.
I. T. Haig, Rome, Italy.
B. F. Heintzleman, Juneau, Alaska.
George M. Hunt, Madison, Wisconsin.
Myron E. Krueger, Berkeley, California.
Woodbridge Metcalf, Berkeley, California.
Fred W. Morrell, Washington, D. C.
DeWitt Nelson, Sacramento, California.
Harold S. Newins, Gainesville, Florida.
Jay H. Price, Milwaukee, Wisconsin.
Arthur W. Sampson, Berkeley, California.

Chairman of Tellers Explains Voting System

In response to a request made by the Section delegates at the 1950 annual meeting, Bernard Frank, chairman of the Society's committee of tellers for national elections, herewith describes the proportional representation method of electing Society officers and Council members. Fifty-eight percent of the eligible voters (Junior, Member, and Fellow grades) cast valid ballots in the most recent national election, held in 1949. Ballots for the 1951 election will be mailed in October. To be counted, they must be returned to the Society office by November 30.

The Hare System of Proportional Representation And How It Works

Each election year an unjustifiably large number of SAF members throw their votes away by improperly marking their ballots. In the 1947 election, 3 percent of the ballots were partially or totally ineffective for this reason, and in the 1949 election about 4 percent.

In order to give members—both new and old—an opportunity to make the most of their voting rights, there follows a brief explanation of the election method used by the Society.

The election method employed by the Society is known as *The Hare System of Proportional Representation*. This method, devised after careful scientific study, was first made public in 1859. It was developed in response to a long-felt need for overcoming the many recognized defects of straight majority voting. It is now in use in public elections in such countries as England, Eire, Sweden, and Denmark, and in a number of cities in the United States and Canada. Many private associations have adopted it also. The Society has employed the Hare system of "P.R." since 1929.

Among the proven advantages of P.R., especially as they pertain to the SAF, we may list the following: (1) provides representation to minority groups, (2) assures majority rule to an extent not approached by any other system of election, (3) permits each member in good standing to vote for candidates he really wants whether or not he thinks they are likely to be elected.

These advantages can largely be lost, however, unless the voting member adheres to the basic (yet extremely elementary) principle of indicating a *numbered* preference for each candidate listed on the ballot. This simple procedure assures the voter that in the event the candidate of his first choice fails to be elected, *his vote will still be available* to help elect the candidate of his second choice, etc. In short, his vote remains effective until some candidate of his choice has been elected.

How P.R. Works

"So far as the voter is concerned, P.R. is simplicity itself. It requires of the elector no more than that he shall indicate his favorite candidates in the order of his preference by putting numbers—1, 2, 3, etc.—alongside their names on the ballot. Irrespective of the number of preferences the voter may express, his vote is counted for but a single candidate—the candidate being the first of the voter's successive preferences who has not already been credited with enough votes to elect him or defeated because he has too few. In this way, P.R. prevents the wasting of votes and gives effect to every vote to which it is possible to give effect."[1]

The *first step* in applying P.R. is taken by the voter himself when he fills in the blank spaces on the ballot (for President and Council members, respectively) by indicating *numerically* his first, second, third, etc., preferences for each of the candidates listed. The ballots, when received by the Society's Teller Committee, are then ready for tabulation.

The *second step* is to determine the minimum number of votes each candidate for office must receive in order to be elected. This quota is determined as follows: (a) The total number of valid ballots is divided by 1 plus the number of positions to be filled; (b) adding 1 to the quotient gives the quota. To illustrate: the number of valid ballots in the 1949 SAF election was 3,564. The number of Council positions to be filled was 9;

$$9 + 1 = 10;\ 3564 \div 10 = 356;$$
$$\text{quota} = 356 + 1 = 357$$

As the reader can readily see, the use of any lesser quota than 357 would have permitted more candidates to be elected than the number of positions to be filled (e.g., a quota of 356 would permit 10 candidates to be elected).

The *third step* is to sort out all first choice ballots (those marked *1* in blank

[1]Hallett, George H. Jr. PR: Proportional representation: the key to democracy. Natl. Muncipal League. P. ix. 1940.

space opposite name of most preferred candidate for President or Council, as the case may be).

The *fourth step* is to tally the votes for each candidate. Those first choice candidates who receive enough votes to fill or exceed the quota are declared elected. Those candidates receiving no first choice votes, together with that candidate receiving the lowest number of first choice votes, are declared defeated.

The *fifth step* involves a series of ballot transfers in accordance with the second, third, etc. choices indicated. Where an elected candidate receives more votes than he needs (i.e., above the quota), in step four, the surplus ballots are redistributed according to candidates marked for second choice among those still unelected and still undefeated candidates. Similarly, the ballots of defeated candidates are redistributed among the second choice candidates indicated by the voters.

By the above method of transfer, each candidate in turn is declared elected or defeated until the required number have been elected. (In the 1949 Council election it was necessary to make nine separate transfers [tabulations] before all 9 positions were finally filled. During this process, a total of 34 voters—over 9 percent of the total—lost their opportunity to help elect a candidate because they failed to indicate choices for all candidates involved.)

Following is a "Result Sheet" involving the election of 5 candidates out of a total of 8. Since 27 ballots were cast, the quota needed to elect a candidate is 5 votes.

$(5 + 1 = 6; 27 \div 6 = 4 + 1 = 5)$

Candidate	First count	Transfer of B's ballot & E's ballot	2d count	Transfer of F's ballot	3d count	Transfer of G's ballot	Final count	Order of election or defeat	
A	5		5		5		5	Elected	(2)
B	1	−1						Defeated	(1)
C	2	+2	4		4	+1	5	Elected	(5)
D	3		3	+2	5		5	Elected	(4)
E	8	−3	5		5		5	Elected	(1)
F	2		2	−2				Defeated	(2)
G	2	+1	3		3	−3		Defeated	(3)
H	4	+1	5		5		5	Elected	(3)
Exhausted						+2	2		
Total	27		27		27		27		

As the above tabulation indicates, *E* received 3 votes more than he needed to be elected, so the surplus ballots were transferred to the voters' second choices, *C* (2 votes) and *G* (1 vote). Since *B* received only one first choice vote, he was declared defeated, and the ballot was transferred to *H*, the voter's second choice. This transfer gave *H* enough votes to be elected on the second count. The same process was extended to elect or defeat the other candidates, one at a time.

It is hoped that the above brief explanation of the workings of P.R. will stimulate a desire on the part of all members to avoid the unnecessary errors or omissions in marking the ballots which have characterized previous elections. No conscientious member would like to contribute to such a situation. The small amount of time required to read over the instructions will be more than repaid by the results obtained.

Questions as to detail, as for example in connection with settling "tie" votes, will undoubtedly arise in the minds of some members. Those who are interested in becoming further acquainted with the method may write the National Municipal League, 299 Broadway, New York 7, N. Y. for literature, especially the "Rules for Counting Ballots in Private Elections under the Hare System of Proportional Representation," December 1948 (mimeo).

BERNARD FRANK, *Chairman*
S. A. F. Tellers' Committee

S.A.F. Consulting Foresters List To Be Published in January JOURNAL

November 1, 1951 is the deadline for consulting foresters to apply for listing in the Society of American Foresters' List of Consulting Foresters which is to be published next in the January 1952 JOURNAL OF FORESTRY.

Minimum requirements for listing are membership in the Society and the designation of fields of specialization commensurate with the consultant's training and experience as shown in the official Society records.

Consulting firms will be listed if one or more of the partners or employees are members of the Society and capable of performing the services offered. In such cases, those individuals' names will appear in the listing.

Persons and firms in the S.A.F. List of Consulting Foresters which was published on pages 65-70 of the January 1951 JOURNAL have been contacted by mail to obtain corrections or revisions of their listings.

Members who are doing consulting forestry work and who have not been listed previously are invited to apply for inclusion in the S.A.F. list. They should provide complete information concerning address, specialization, and territory served, following the form used in the List of Consulting Foresters published in the January 1951 JOURNAL OF FORESTRY. A limited number of reprints of that list are available for free distribution.

November 1, 1951 is the last date on which listings will be accepted for publication in the January 1952 list.

Students Submit Dual Applications

Eligible forestry students who aspire to Junior membership in the Society upon graduation now have to submit only one application form. In applying for Student Membership, students also indicate their wish to be advanced to the Junior grade as soon as they become eligible. The new, streamlined procedure which was given a trial last spring, was approved by R. E. McArdle, chairman of the Council Committee on Membership, and is being put into effect this month with the issuance of revised membership forms. The new forms, which vary only slightly from those now in use, will be supplied to Section officers upon request.

A member of the faculty at each accredited forestry school serves as his Section's representative in acquainting forestry students with the goals, activities, and work program of his Section and of the Society. Over 1,200 junior and senior students at the 25 accredited forestry schools are eligible for Student Membership. Nearly 700 forestry students applied for membership last spring.

Dues are $3 per calendar year and entitle Student Members to participate in Section and Chapter activities as well as to receive the JOURNAL OF FORESTRY. Student Members are provided membership cards and are entitled to wear the Society emblem.

Section representatives provide the Society office with official lists of all eligible graduates so that the eligibility of Student Members for advancement to the Junior grade can be ascertained.

Colleges and Universities in the United States Offering Instruction in Forestry

September 1, 1951

Accredited

The following institutions are accredited for forestry instruction by the Council of the Society of American Foresters.

Alabama Polytechnic Institute, Wilbur B. DeVall, Department of Forestry, Auburn, Alabama.

University of California, F. S. Baker, School of Forestry, Berkeley 4, California.

Colorado A & M College, J. V. K. Wagar, School of Forestry and Range Management, Fort Collins, Colorado.

Duke University, C. F. Korstian, School of Forestry, Durham, North Carolina.

University of Florida, C. M. Kaufman, School of Forestry, Gainesville, Florida.

University of Georgia, D. J. Weidell, School of Forestry, Athens, Georgia.

University of Idaho, D. S. Jeffers, School of Forestry, Moscow, Idaho.

Iowa State College, G. B. Hartman, Department of Forestry, Ames, Iowa.

Louisiana State University, Ralph W. Hayes, School of Forestry, Baton Rouge 3, Louisiana.

University of Maine, R. I. Ashman, Department of Forestry, Orono, Maine.

University of Massachusetts, R. P. Holdsworth, Department of Forestry and Wildlife Management, Amherst, Massachusetts.

Michigan State College, T. D. Stevens, Department of Forestry, East Lansing, Michigan.

University of Michigan, S. G. Fontanna, School of Natural Resources, Ann Arbor, Michigan.

University of Minnesota, F. H. Kaufert, School of Forestry, St. Paul 1, Minnesota.

University of Missouri, R. H. Westveld, Department of Forestry, Columbia, Missouri.

Montana State University, Ross A. Williams, School of Forestry, Missoula, Montana.

State University of New York, J. S. Illick, College of Forestry, Syracuse 10, New York.

North Carolina State College, R. J. Preston, School of Forestry, Raleigh, North Carolina.

Oregon State College, Paul M. Dunn, School of Forestry, Corvallis, Oregon.

Pennsylvania State College, Victor Beede, Department of Forestry, State College, Pennsylvania.

Purdue University, E. R. Martell, Department of Forestry, Lafayette, Indiana.

Utah State Agricultural College, Lewis M. Turner, School of Forest, Range and Wildlife Management, Logan, Utah.

University of Washington, Gordon D. Marckworth, College of Forestry, Seattle 5, Washington.

West Virginia University, W. C. Percival, Division of Forestry, Morgantown, West Virginia.

Yale University, George A. Garratt, School of Forestry, New Haven 11, Connecticut.

Not Accredited

The following institutions offer professional and technical curricula in forestry, but do not meet the requirements for accreditation.

Stephen F. Austin State College, William R. Owens, Jr., Department of Forestry, Nacogdoches, Texas.

University of Connecticut, A. Raymond Kienholz, Department of Forestry and Wildlife Management, Storrs, Connecticut.

Louisiana Polytechnic Institute, Lloyd P. Blackwell, Department of Forestry, Ruston, Louisiana.

Michigan College of Mining and Technology, U. J. Noblet, Department of Forestry, Houghton, Michigan.

University of New Hampshire, Clark Stevens, Department of Forestry, Durham, New Hampshire.

Oklahoma Agricultural and Mechanical College, Glen R. Durrell, Department of Forestry, Stillwater, Oklahoma.

Virginia Polytechnic Institute, John J. Aulbach, Department of Biology, Blacksburg, Virginia.

State College of Washington, E. H. Steffen, Department of Forestry and Range Management, Pullman, Washington.

Introductory and Specialized Courses

Arkansas A & M College, H. H. Chamberlin, Monticello, Arkansas.

University of Arkansas, Department of Horticulture and Forestry, Fayetteville, Arkansas.

Clemson Agricultural College, Department of Botany, Clemson, South Carolina.

Cornell University, G. A. Swanson, Department of Conservation, Ithaca, New York.

Grand Rapids Junior College, Willis E. Chase, Grand Rapids, Michigan.

Harvard University, Harvard Forest, Petersham, Massachusetts.

Idaho State College, Ralph R. Wilson, Pocatello, Idaho.

University of Illinois, J. Nelson Spaeth, Department of Forestry, Urbana, Illinois.

University of Kentucky, O. M. Davenport, Department of Horticulture, Lexington, Kentucky.

Lassen Junior College, F. Ralph Throop, Division of Vocational Forestry and Lumbering, Susanville, California.

Mississippi State College, R. T. Clapp, Department of Forestry, State College, Mississippi.

John Muir College, W. G. Kohner, Pasadena 3, California.

North Dakota Agricultural College, J. J. Zaylskie, Department of Horticulture and Forestry, Fargo, North Dakota.

North Dakota School of Forestry, C. N. Nelson, Bottineau, North Dakota.

Northwestern State College, H. E. Townsend, Agriculture Department, Natchitoches, Louisiana.

Ohio State University, Department of Horticulture and Forestry, Columbus 10, Ohio.

Paul Smith's College, O. P. Wallace, Forestry Department, Paul Smiths, New York.

Rutgers University, Gordon M. Day, Department of Forestry, New Brunswick, New Jersey.

Rutland Junior College, Richard C. Rose, Rutland, Vermont.

University of Tennessee, E. H. Clarke, Department of Horticulture and Forestry, Knoxville 16, Tennessee.

Texas A & M College, Vernon Young, Department of Range and Forestry, College Station, Texas.

University of Vermont, W. R. Adams, Department of Forestry, Burlington, Vermont.

University of Virginia, Chapin Jones, School of Forestry, Charlottesville, Virginia.

University of Wisconsin, S. A. Wilde, College of Agriculture, Madison, Wisconsin.

Ranger School

New York State Ranger School, James Dubuar, Wanakena, New York.

Section Officers

(As of August 1, 1951. Dates terms began are given.)

Allegheny Section

2-17-51

Maurice K. Goddard, Chairman
Pennsylvania State Forest School, Mont Alto, Pa.
D. E. Hess, Vice Chairman
Glatfelter Pulpwood Co., Murphy Bldg., Gettysburg, Pa.
Harvey R. Frantz, Secretary-Treasurer
INCODEL, Dodson Building, 528 N. New Street, Bethlehem, Pa.
D. E. Hess, Membership Chairman
Glatfelter Pulpwood Co., Murphy Bldg., Gettysburg, Pa.
Chapters: 1. New Jersey
2. West Virginia

Appalachian Section

2-12-51

Theodore H. Davis, Chairman
Forestry Department, Champion Paper & Fibre Co., Canton, N. C.
George W. Dean, Vice Chairman
Virginia Forest Service, Charlottesville, Va.
Roger W. Wolcott, Secretary-Treasurer
Box 2582, Raleigh, N. C.
George W. Dean, Membership Chairman
Virginia Forest Service, Charlottesville, Va.
Chapters: None

Central Rocky Mountain Section

5-26-51

Ralph C. Bryant, Chairman
School of Forestry & Range Management, Colorado A & M College, Fort Collins, Colo.
Warren M. Tracy, Vice Chairman
U. S. Forest Service, Denver 2, Colo.
Donald J. Hodges, Secretary-Treasurer
U. S. Forest Service, Estes Park, Colo.
Warren M. Tracy, Membership Chairman
U. S. Forest Service, Denver 2, Colo.
Chapters: 1. Black Hills

Central States Section

9-22-50

Warren W. Chase, Chairman
School of Natural Resources, University of Michigan, Ann Arbor, Mich.
Irving I. Dickman, Vice Chairman
Ohio Division of Forestry, 1500 Dublin Road, Columbus 12, Ohio
Charles S. Walters, Secretary-Treasurer
219 New Agriculture Building, Urbana, Ill.
Irving I. Dickman, Membership Chairman
Ohio Division of Forestry, 1500 Dublin Road, Columbus 12, Ohio
Chapters: 1. Illinois Technical Forestry Association
2. Indiana
3. Lower Michigan
4. Ohio

Columbia River Section

7-1-50

Clarence Richen, Chairman
4404 N. E. 32nd Place, Portland 11, Oreg.
L. O. Barrett, Vice Chairman
801 W. 8th Street, Vancouver, Wash.
Norman E. Bjorklund, Secretary
West Coast Lumbermen's Association, 1410 S. W. Morrison Street, Portland 5, Oreg.
William S. Phelps, Treasurer
2621 19th Avenue, Forest Grove, Oreg.
Elmer Matson, Membership Chairman
258 N. E. Murry Avenue, Beaverton, Oreg.
Chapters: 1. Central Oregon
2. Hawaii
3. Longview
4. Portland
5. Shasta-Cascade
6. Siskiyou
7. Umpqua-Coquille
8. Willamette

Gulf States Section

5-4-51

Arthur W. Nelson, Jr., Chairman
3253 23rd Avenue, Meridian, Miss.
M. O. Stark, Vice Chairman
309 South Denver Street, Jackson, Miss.
John G. Guthrie, Secretary-Treasurer
Box 532, Wiggins, Miss.
M. O. Stark, Membership Chairman
309 South Denver Street, Jackson, Miss.
Chapters: 1. Jackson
2. Longleaf
3. North Mississippi
4. Southwest Mississippi
5. North Louisiana
6. Central Louisiana
7. Southeast Louisiana
8. Southwest Louisiana
9. Fort Worth-Dallas
10. Huntsville-Houston-College Station
11. Lufkin-Nacogdoches.

Inland Empire Section

5-25-51

Royce G. Cox, Chairman
Potlatch Forests, Inc., Lewiston, Idaho
Rolf B. Jorgenson, Vice Chairman
U. S. Forest Service, Riggins, Idaho
Vernon H. Burlison, Secretary-Treasurer
Assistant Extension Forester, University of Idaho, Moscow, Idaho
Hans Roffler, Membership Chairman
U. S. Forest Service, Coeur d'Alene, Idaho
Chapters: None

Intermountain Section

7-1-51

F. C. Koziol, Chairman
465 Federal Building, Salt Lake City, Utah
John Burt, Vice Chairman
Room 102, Capitol Building, Salt Lake City, Utah
Robert L. Safran, Secretary-Treasurer
U. S. Forest Service, Hanna, Utah
C. M. Bowen, Membership Chairman
1341 E. 9th N., Logan, Utah
Chapters: 1. Southern and Eastern Utah

Kentucky-Tennessee Section

11-10-50

Maxwell MacMaster, Chairman
Stanley, Inc., Pulaski, Tenn.
Harry Nadler, Vice Chairman
Box 31, Pineville, Ky.
F. Henry Sipe, Secretary-Treasurer
Winchester, Ky.
Harry Nadler, Membership Chairman
Box 31, Pineville, Ky.
Chapters: None

New England Section

2-23-51

William C. MacAdam, Chairman
Francestown, N. H.
R. S. Monahan, Vice Chairman
41 College Street, Hanover, N. H.
Edwin L. Giddings, Secretary-Treasurer
Penobscot Development Co., Great Works, Me.
R. S. Monahan, Membership Chairman
Hanover, N. H.
Chapters: None

New York Section

1-26-51

Albert J. Woodford, Chairman
Box 84, Herkimer, N. Y.
Fred E. Winch, Vice Chairman
New York State College of Agriculture, Ithaca, N. Y.
James E. Davis, Secretary-Treasurer
State University of New York, College of Forestry, Syracuse 10, N. Y.
L. P. Plumley, Membership Chairman
State University of New York, College of Forestry, Syracuse 10, N. Y.
Chapters: 1. Adirondack
2. Black River Valley
3. Capital District
4. Iroquois
5. Longhouse
6. Metropolitan
7. Mid-Hudson
8. Ontario
9. Upper Hudson
10. Western New York

Northern California Section

7-1-51

R. D. Roseberry, Chairman
Diamond Match Company, Stirling City, Calif.
Henry J. Vaux, Vice Chairman
School of Forestry, University of California, Berkeley 4, Calif.
T. H. Harris, Secretary-Treasurer
Blister Rust Control, 2288 Fulton Street, Berkeley 4, Calif.
John Zivnuska, Membership Chairman
School of Forestry, Univ. of California, Berkeley 4, Calif.
Chapters: 1. Bay Area
2. Eldorado-Amador
3. Feather River
4. Redding
5. Redwood
6. Sacramento
7. San Joaquin

Northern Rocky Mountain Section

5-1-51

Jack S. Barrows, Chairman
U. S. Forest Service, Federal Building, Missoula, Mont.

Alfred E. Spaulding, Vice Chairman
U. S. Forest Service, Federal Building, Missoula, Mont.
William C. Hodge, Secretary-Treasurer
Northern Rocky Mountain Forest and Range Experiment Station, Federal Building, Missoula, Mont.
S. B. Hutchison, Membership Chairman
Northern Rocky Mountain Forest and Range Experiment Station, Federal Building, Missoula, Mont.
Chapters: None.

Ozark Section

1-27-51

Nat Walker, Chairman
344 Admiral Road, Stillwater, Okla.
Gordon D. Hartrick, Vice Chairman
Fountain Hill, Ark.
Peter W. Fletcher, Secretary-Treasurer
Department of Forestry, University of Missouri, Columbia, Mo.
Paul Y. Burns, Membership Chairman
Department of Forestry, University of Missouri, Columbia, Mo.
Chapters: 1. Missouri
2. Oklahoma
3. Southeast Arkansas

Puget Sound Section

7-1-51

Bernard L. Orell, Chairman
P. O. Box 207, Olympia, Wash.
W. Howard Johnson, Vice Chairman
1410 West Webster, Seattle 6, Wash.
Donald F. McKay, Secretary-Treasurer
3307 North 29th, Tacoma 7, Wash.
H. Phil Brandner, Membership Chairman
U. S. Forest Service, Bellingham, Wash.
Ray F. Taylor, Vice Chairman for Alaska
Box 2955, Juneau, Alaska
John E. Liersch, Vice Chairman for British Columbia
375 Stevens Drive, Hollyburn, B.C., Canada.
Chapters: 1. North Olympic
2. Southwest Washington

Southeastern Section

1-13-51

Joseph T. McCullough, Chairman
931 East Franklyn Street, Ocala, Fla.
Daniel C. Royal, Vice Chairman
Box 352, Selma, Ala.
Eugene W. Gemmer, Secretary-Treasurer
Box 111, Lake City, Fla.
Jack May, Membership Chairman
Alabama Polytechnic Institute, Auburn, Ala.
Chapters: 1. Alabama
2. Florida
3. Georgia

Southern California Section

7-1-51

Everett L. Hamilton, Chairman
U. S. Forest Service, Glendon, Calif.
Gustav Juhren, Vice Chairman
1430 Morada Place, Altadena, Calif.
Samuel F. Gossard, Secretary Treasurer
Henninger Flats Nursery, Pine Crest Drive, Altadena, Calif.
Gustav Juhren, Membership Chairman
1430 Morada Place, Altadena, Calif.
Chapters: None

Southwestern Section

7-1-51

S. T. Carlson, Chairman
National Park Service, P.O. Box 1728, Santa Fe, N. Mex.
Hugh Harvey, Vice Chairman
716 North Vassar, Albuquerque, N. Mex.
Dean Cutler, Secretary-Treasurer
4205 Courtney Drive, Albuquerque, N. Mex.
Lawrence F. Hamilton, Membership Chairman
2037 Kiva Road, Santa Fe, N. Mex.
Chapters: None

Upper Mississippi Valley Section

11-1-50

Galen W. Pike, Chairman
Box 338, Duluth, Minn.
Zigmond A. Zasada, Vice Chairman
Lake States Forest Experiment Station, Grand Rapids, Minn.
Donald M. Stewart, Secretary-Treasurer
Plant Pathology Building, University Farm, St. Paul 1, Minn.
L. B. Ritter, Membership Chairman
338 State Office Building, St. Paul, Minn.
Chapters: 1. Iowa
2. Lake Superior
3. North Dakota
4. Northwest
5. Southern

Washington Section

6-5-51

John F. Shanklin, Chairman
Division of Land Utilization, U. S. Department of the Interior, Washington 25, D. C.
S. L. Frost, Vice Chairman
American Forestry Association, 919 17th Street, Northwest, Washington 6, D. C.
Walter L. Schipull, Secretary-Treasurer
U. S. Forest Service, Room 4204, South Agriculture Building, Washington 25, D. C.
Vance B. Tribbett, Membership Chairman
Room 5545, Interior Building, Washington 25, D. C.

Wisconsin-Upper Michigan Section

3-30-51

Maurice W. Day, Chairman
Dunbar Forest Experiment Station, Sault Ste. Marie, Mich.
Richard C. Hammerschmidt, Secretary-Treasurer
Cliffs Dow Chemical Co., Marquette, Mich.
Richard C. Hammerschmidt, Membership Chairman
Cliffs Dow Chemical Co., Marquette, Mich.

Candidates for Membership

Candidates for membership whose applications were received in the Society office prior to August 1, 1951 are listed below. Names, positions, addresses, and education are given.

Action regarding the eligibility of these candidates will be taken by the Council as of October 1, 1951. Comments, protests, or important information regarding the qualifications for membership of candidates listed are invited from present voting members. All such communications are kept strictly confidential, being used only by the Council in taking final action on applications.

The names of those candidates who are elected will be published in the Society Affairs department of the November 1951 JOURNAL OF FORESTRY. The names of those who signify their acceptance of election will be published in subsequent issues of the JOURNAL.

Alleghany Section

Junior Grade

Best, H. C., Forester, Armstrong Forest Co., Lock Haven, Pa; Pa. State, B.S.F., 1950.
Merck, H. L., 313 McLane Ave., Morgantown, W. Va.; W. Va. Univ., B.S.F., 1951. (Student, 1951).
Sarchino, J., Davis, W. Va.; W. Va. Univ., B.S.F., 1950.
Szpak, C. A., Jr., 819 N. First St., Lehighton, Pa.; Pa. State, B.S.F., 1950.
Wendel, G. W., 208 E. Cliff St., Somerville, N. J.; Iowa State, B.S.F., 1951. (Student, 1951).
Wessel, H., Ridge and Northwestern Ave., Phila., Pa.; Pa. State, B.S.F., 1948.

Appalachian Section

Junior Grade

Silcocks, W. R., U.S.F.S., Asheville, N. C.; Cornell Univ., B.S.F., 1931. Reinstatement.
Ward, M. F., Lbr. Inspt., M. W. Jones Lbr. Co., Raleigh, N. C.; N. C. State, B.S.F., 1950.

Associate Grade

Orrell, C. D., Chief Reviewer and Appraiser, Federal Land Bank of Columbia, Columbia, S. C.

Central Rocky Mountain Section

Junior Grade

Mortensen, J. M., Box 218, Yankton, S. Dak.; Iowa State, B.S.F., 1951 (Student, 1951).

Central States Section

Junior Grade

Poppema, D. R., 816 A. Chestnut Rd., E. Lansing, Mich.; Mich. State, B.S.F., 1951; M.F., 1951.
Stein, R. E., Unloading Supv., Detroit Sulphite Pulp and Paper Co., River Rouge, Mich.; Univ. of Mich., B.S.F., 1950; M.F., 1951.

Member Grade

Preston, E. J., Forester, Ohio Edison Co., Akron, Ohio; Mich. State, B.S.F., 1924 (Junior 1934R50).
Quigley, K. L., Forest Economist, U.S.F.S., Columbus, Ohio; Colo. A & M., B.S.F., 1939. (Junior 1942R46).

Columbia River Section

Member Grade

Milius, H. C., Forester, Brooks-Scanlon, Inc., Bend, Oreg.; Iowa State, B.S.F., 1936; M.F., 1937. (Junior 1936R50).
Prahar, L. B., Forester, G. E. Owen Lbr. Co., Eugene, Oreg.; Univ. of Me., B.S.F., 1938; N. Y. Univ., L.L.B., 1950.

Gulf States Section

Junior Grade

Folken, W. F., Sec.-Treas., Warren Hood Lbr. Co., Inc., Jackson, Miss.; Iowa State, B.S.F., 1937.
Loe, W. A., Quitman, La.; La. State, B.S.F., 1950.

Member Grade

Burns, J. D., Forester, Tremont Lbr. Co., Joyce, La.; La. State, B.S.F., 1947; M.F., 1948.
Cowger, R. D., Forester, U.S.F.S., Charleston, Miss.; W. Va., B.S.F., 1946. (Junior 1947).

Affiliate Grade

Newland, H. M., Jr., Thr. Marker, Champion Paper Co., Huntsville, Texas; Stephen F. Austin State College, B.F., 1950.
Nibert, J. M., Forester, Keith Cranston and Assoc., Leland, Miss.; L. P. I., B.S., (Forestry), 1950.

Associate Grade

Lay, D. W., Wildlife Biologist, Texas Game, Fish and Oyster Comm., Buna, Texas; Texas A. & M., B.S.A., 1936; M.S., (Fish and Game), 1938.

Inland Empire Section

Junior Grade

Stage, A. R., Priest River Exp. Sta., Priest River, Idaho; Univ. of Mich., B.S.F., 1951. (Student, 1951).

New England Section

Junior Grade

Boris, A. J., 1 Eames Ave., Worcester, Mass.; Univ. of Mass., B.S.F., 1951. (Student, 1951).

Member Grade

Campana, R. J., Research Fellow, Yale Univ., U.S.D.A., New Haven, Conn.; Univ. of Idaho, B.S.F., 1943; Yale, M.F., 1947. (Junior 1944).

Ericson, E. H., Jr., Owner Mgr., Ericson Lbr. Co., Manchester, Mass.; N. C. State, B.S.F., 1941. (Reinstatement).

Pauley, S. S., Asst. Prof., Harvard Univ., Petersham, Mass.; Univ. of Minn., B.S.F., 1939; Mich. State, M.S., 1942; Harvard Univ., Ph.D., 1947. (Junior 1944).

Schrack, R. A., Forester, U.S.D.A., E. Greenwich, R. I.; Pa. State, B.S.F., 1944 (Junior 1944).

Schubert, B. L., Jr., Lbr. Buyer, Fred W. Mears Heel Co., Inc., Lawrence, Mass.; Pa. State, B.S.F., 1915. (Junior, 1930).

True, R. M., Forester, S. D. Warren Paper Co., Cumberland Mills, Me.; Univ. of Me., B.S.F., 1937. (Junior, 1938).

Wing, G. E., Asst. Mgr., Woodlands, Hollingsworth and Whitney Co., Waterville, Me.; Univ. of Me., B.S.F., 1926; Yale, M.F., 1928. (Junior 1929R50).

New York Section

Junior Grade

Burt, R. H., Box 93, Elizabethtown, N. Y.; Univ. of Mass., B.S.F., 1950.

Palmer, J. W., Forestry Aid, U.S.F.S., Kingston, N. Y.; N. Y. State, B.S.F., 1950.

Member Grade

Adolph, R. D., Consulting Forester, Highland Falls, N. Y.; N. Y. State, B.S.F., 1915. (Junior 1924).

Honorary Grade

Whittemore, L. F., Pres., Brown Co., Berlin, N. H., and trustee and director of various industrial, educational, and conservation organizations. Dartmouth College, M.A.

Northern Rocky Mountain Section

Member Grade

Cloninger, R. T., Forester, U.S.D.A., Libby, Mont.; Univ. of Idaho, B.S.F., 1941. (Junior, 1948).

Ozark Section

Junior Grade

Allen, L. A., 681 N. Forest Ave., Webster Groves, Mo.; Iowa State, B.S.F., 1951. (Student, 1951).

Brugere, G. S., Broken Bow, Okla.; Iowa State, B.S.F., 1951.

Hunt, E. V., Jr., Research Forester, Univ. of Ark., Batesville, Ark.; Univ. of Mo., B.S.F., 1951.

Member Grade

Sands, W. M., Commodity Industry Sepc., St. Louis Dist., Corps of Engrs., St. Louis, Mo.; Mich. State, B.S.F., 1924. (Junior 1936R48).

Affiliate Grade

Herron, Q. H., Forester Herron Industries, Idabel, Okla.; Okla. A & M., B.S.F., 1951.

Leachman, J. C., Forester, Union Sawmill Co., Huttig, Ark.; L. P. I., B.S., (Forestry), 1950.

Puget Sound Section

Junior Grade

Scheider, E. C., Tbr. Cruiser, Cascade Lbr. Co., Yakima, Wash.; Univ. of Wash., B.S.F., 1950.

Taylor, D. J., Forester, Washington State Div. of Forestry, Olympia, Wash.; Univ. of Wash., B.S.F., 1950.

Affiliate Grade

Armstrong, G. H., Box 1067, U.S.F.S., Petersburg, Alaska; Washington State College, B.S. (Forestry), 1951.

O'Donnell, A. R., Box 895, Port Orchard, Wash.; State College of Wash., B.S., (Forestry, 1949).

Southeastern Section

Junior Grade

Culpepper, T. R., Proj. Forester, State of Ala., Uriah, Ala.; A.P.I., B.S.F., 1949.

Gabriel, E. T., Land & Timber Agent, Savannah River Lbr. Co., Savannah, Ga.; Univ. of Ga., B.S.F., 1928. Reinstatement.

Jackson, W. A., County Forester, Fla. Forest Service, Tallahassee, Fla.; Univ. of Fla., B.S.F., 1949.

Russell, B. A., Private Forester, Waverly, Ga.; Univ. of Georgia, B.S.F., 1941.

Smith, R. F., Box 124, Elba, Ala.; A.P.I., B.S.F., 1950.

Member Grade

Brasington, J. J., Asst. Forest Engr., Int. Paper Co., Mobile, Ala.; Univ. of Fla., B.S.F., 1942; M.S.F., 1947. (Junior, 1944).

Conarro, R. M., Asst. Chief, U.S.F.S., Atlanta, Ga. (Junior, 1929).

Fortin, J. B., Forester, U.S.F.S., Atlanta, Ga.; N. Y. State, B.S.F., 1931; M.F., 1932.

Johnson, J. W., Jr., Chief, Forestry Branch, U. S. Air Force, Eglin, Fla.; Mont. State, B.S.F., 1929; Univ. of Tenn., M.S., (Botany), 1933.

Juskie, B., Capt., U.S. Air Force; Univ. of Fla., B.S.F., 1948. (Junior, 1948).

Mills, W. L., Dist. Supt., Int. Paper Co., Mobile, Ala.; N. Y. State, B.S.F., 1943. (Junior, 1944).

Muller, P. M., Forester, Gair Woodlands Corp., Savannah, Ga.; Iowa State, B.S.F., 1935. (Junior 1936R46).

Nance, J. B., Wood Buyer, Rayonier Inc., Fernandina, Fla.; Univ. of Ga., B.S.F., 1937. (Junior, 1944)

Palmer, S. H., Dist. Rgr., U.S.F.S., Gainesville, Ga.; N. Y. State, B.S. F., 1932; M.F., 1933. (Junior 1934).

Sloss, H. H., Asst. Mgr., Plywood Sales, Brunswick, Ga.; Univ. of Mich., B.S.F., 1926. (Junior, 1944).

Steedley, A. G., Inspt., U.S.F.S., McRae, Ga.; Ga. Industrial College, (2 yrs.). (Junior, 1941).

Affiliate Grade

Bell, E. W., Tract Supt., Woodlands Div., Union Bag and Paper Corp., Savannah, Ga.

Griffith, R. L., Pres., Dixie Wood, Inc., Milledgeville, Ga.; Spring Hill College, (2 yrs.).

Upper Mississippi Valley Section

Junior Grade

Fry, H. J., R.R. #1, Carlisle, Iowa; Iowa State, B.S.F., 1951. (Student, 1951).

Posekany, R. L., Elberon, Iowa; Iowa State, B.S.F., 1951. (Student, 1951).

Sorenson, W. M., Box 142, Ames, Iowa; Iowa State, B.S.F., 1951. (Student, 1951).

Stevens, R. E., 610 Burns St., Ida Grove, Iowa; Iowa State, B.S.F., 1951. (Student, 1951).

Washington Section

Junior Grade

Cadman, W. B., Army Map Service, Corps of Engrs., Washington, D. C.; Pa. State, B.S.F., 1951.

Wisconsin-Upper Michigan Section

Junior Grade

Landphier, G. L., Waunakee, Wis.; Univ. of Minn., B.S.F., 1950.

Miller, R. R., 128 Chippewa St., Eau Claire, Wis.; Iowa State, B.S.F., 1951. (Student, 1951).

Candidates Elected

The following persons were elected to the indicated grades of membership by the Council on August 1, 1951.

Junior Grade

Baker, R. D.
Barlow, K. J.
Brown, W. L.
Burkhardt, E. C.
Cook, D. R.
Croom, N. P.
Dahlgreen, A. K.
Drots, W. D.
Dunford, H. V.
Ference, G. M.
Garey, C. A.
Gill, R. C.
Girardeau, J. O.
Goodwin, J. C., Jr.
Hakenson, C. G.
Hall, J. E.
Hawkins, W. Z.
Hester, J. E.
Hill, J. A.
Idleman, M. K.
Katovich, A.
Koier, W. L., Jr.
Lafitte, W. E.
Links, T. A.
Marlow, E. G.
May, G. M.
Navratil, T. W.
Penniman, E. C.
Pole, R. W.
Rainer, Y. W.
Randell, M. T.
Reames, W. H.
Renard, L. P.
Robins, C. L.
Rossasco, E. M.
Tschannen, L. E.
Rawls, I. W.
Schwab, C. A.
Seglund, R. O.
Shelton, R. K.
Southwick, F. L.
Starling, W. B.
Steere, R. B.
Taube, A. H.
Thrower, R. L.

Member Grade

Bishop, H. F., (re)
Byrd, J. M.
Carruth, H. C.
Dietterich, C. W.
Goggans, J. F.
Kilgore, W. E.
Knutson, K. K.
Mavor, F. E.
Rheinberger, R. E.
Stadler, G. S.
Turner, M. R.

Affiliate Grade

Cooper, W. B.
Dance, J. E.
Darsey, F. E.
Davis, B. H.
Delaney, L.
Dickerson, H. C.
Easley, A. K.
Flick, A. W., Jr.
French, C. S.
Freeman, J. E.
Futch, J. M.
Hinkie, J. B.
Hooker, G. B.
Hunt, A. C.
Johnson, A. H.
Johnston, M. C.
Kelly, F. M.
Kienholz, J. B.
Luzader, J. L.
Lynch, J. S.
Merridith, W. K.
May, L. C.
Miesch, J. R.
Mudd, L. S.
Patton, E. N., Jr.
Rees, L. N.
Richards, E. G.
Ross, B. F.
Ruffin, W. C.
Tyson, R. L.
Vogt, L. C.
Wheeler, H. A.

Associate Grade

Compton, L. F.
Ellis, A. M.
Van Rensselaer, M., (re)

New Members and Advancements

The new members and members who have been advanced in grade who are listed below are eligible for participation in activities of the Society of American Foresters, including the meetings and projects of Sections, Chapters, Divisions, and Committees. They have submitted their applications for membership, properly endorsed, and have been declared eligible by the Council. By accepting election these members have indicated their desire to assist the Society in the fulfillment of its objectives.

Allegheny Section

Student Grade

WEST VIRGINIA UNIVERSITY

Merck, H. L.

Junior Grade

Kirk, C. R., Pine Grove Mills, Pa.

Member Grade

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Section Honors Outstanding Students

Recipients of the Central States Section's annual awards to the outstanding Student Member graduating from each of the forestry schools in the Section were Donald C. McGregor, Purdue University; Leo F. Baumgartner, Michigan State College; and Albert R. Stage, University of Michigan.

Selected by the faculties at their respective schools, each man will have his first year's Junior Member dues paid by the Central States Section.

The awards were made on the basis of scholarship, personality, activities, and ability.

Forestry News

James H. Diehl Named Cooperative Protection Chief, U.S. Forest Service

James H. Diehl has been named chief of the Division of Cooperative Forest Protection, U. S. Forest Service. He will head up Forest Service participation in the state-federal cooperative program to protect state and privately owned forests against fire.

For the past four years Mr. Diehl has been chief of Forest Service state and private forestry work in Ohio, Indiana, Illinois, Michigan, Wisconsin, Missouri, Kansas, Iowa, Minnesota, and North Dakota, with headquarters in Milwaukee, Wis. Previous to that he headed up the division of recreation, lands, wildlife, and range management for the same region and served as an assistant in charge of national forest fire control.

Upon receiving his B. S. degree in forestry from Pennsylvania State College in 1924, he was employed as a land acquisition field assistant in the George Washington National Forest of Virginia. Transferring to the West, he served as assistant forester and ranger in Montana and Idaho between 1925 and 1935.

In 1935 he went to the Clark National Forest in Missouri as supervisor and served in a similar capacity on the Mark Twain National Forest of the same state, before moving to the regional headquarters at Milwaukee.

Greeley Transferred to Research Administrative Duty

Appointment of Arthur W. Greeley as assistant to the director of the Pacific Northwest Forest and Range Experiment Station, Portland, Ore., has been announced by Robert W. Cowlin, station director.

In his new position Greeley will help establish objectives, policies, and standards for the station's scientific research work. He will also aid in the coordination of research programs, both within the station and with other federal and state research agencies. He is the son of Col. W. B. Greeley, former chief of the U. S. Forest Service and now vice president of the West Coast Lumbermen's Association.

He began his Forest Service career on the St. Joe National Forest in Idaho after receiving a B. S. degree in forestry from the University of Washington in 1934 and the master of forestry degree from Yale University in 1935.

ARTHUR W. GREELEY

Supervisor of the Lassen National Forest in California since 1947, Greeley previously worked in various capacities on five national forests in Montana and Idaho. From 1944 to 1947, he served as chief of planting and stand improvement in the division of timber management in the Washington, D. C., office of the Forest Service.

BYRON M. RADCLIFFE has recently been appointed assistant professor of forestry at Purdue University. He will take over the duties of J. Hugo Kraemer who recently resigned to accept the position of chief, conservation section, Lumber and Wood Products Division, National Production Administration.

Mr. Radcliffe has a background of training in both forestry and engineering. He recently received the masters degree in engineering mechanics. His duties at Purdue will be largely research in hardwood utilization and product development. He will also give instruction in timber mechanics.

A LAMINATED GAVEL, containing characteristic woods from each of seven college forest properties in New York State, was presented by the 1951 graduating class to Dean Joseph S. Illick, *left*, of the State University College of Forestry, Syracuse, N. Y. The wood samples were cut into thin layers, laminated electronically, and specially turned in the laboratories and shops of the college's Department of Forest Utilization. Presenting gavel is Robert Franke, Brooklyn, senior in charge of project.

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Atlantic Coastline Adds Another Forester to Staff

Herbert B. Attaway, Jr. has been appointed forestry agent for the Atlantic Coast Line Railroad with headquarters at Wilmington, N. C., it has been announced by Const Line officials.

Attaway assumed his duties on July 1, 1951. A native of Beaufort, S. C., he received his academic training in forestry at Clemson college and the University of Florida. He majored in Forest Economics, receiving B. S. and M. S. degrees from the University of Florida.

Prior to his appointment with the Coast Line, Attaway served with the Forestry Department of the West Virginia Pulp and Paper Company at Summerville, S. C., and the U. S. Forest Service, in the state of Washington.

HERBERT B. ATTAWAY, JR.

Attaway will work as assistant to Paul W. Wright, industrial forester, in the encouragement of better forestry practices in the territory served by the Atlantic Coast Line, to assist the forest industry, and to extending forest management to scattered railroad timberlands.

Roster of Agriculturists Available for Foreign Assignment

New career opportunities in the field of agriculture are being opened by the Point Four program of technical cooperation. It is anticipated that as many as 600 experienced professional agriculturists, including foresters, will be needed in coming months to go out on foreign assignments.

In this mobilization of United States agricultural specialists for foreign service, exceptionally good men are needed. They must be skilled in their professions with leadership ability and maturity of judgment. They must be capable of representing the United States abroad in the role of agricultural statesmen.

The responsibility for developing a roster of agriculturists capable of performing assignments under the Point Four Program has been placed in the Department of Agriculture. Interested persons should complete Standard Form 57 (Application for Federal Employment) and return it to: Parke G. Haynes, chief, Division of Employment, Office of Personnel, U. S. Department of Agriculture, Washington 25, D. C.

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Increase in National Forest Receipts

Receipts from national forests during fiscal year 1951 reached an all-time high of $56,145,857, an increase of 67 percent over the $33,594,614 of fiscal year 1950.

Approximately 90 percent of the total receipts was derived from the sale of more than 4 billion board feet of timber. This is also a new high in volume of timber cut from the national forests. Revenue from timber sales totaled $51,103,068 as compared with $29,379,217 for the previous year.

Mr. Watts estimated that the cut could be increased to 6 billion board feet if roads were built into mature timber stands fully ready for marketing but now out of reach of would-be purchasers.

Second important source of Forest Service receipts was the grazing of cattle, sheep, and other livestock. Grazing receipts totaling $4,165,573 for the year ending June 30, represent an increase of nearly half a million dollars over the grazing receipts of 1950.

Revenue from summer cabin sites, recreational developments, oil drilling, mining, pastures, water power rights, and other land uses brought in $877,216 during 1951.

McGahan Named to Debarking Study Staff

Merritt W. McGahan has been appointed research assistant to the Research Foundation of the State University of New York, and will work on chemical debarking studies recently initiated at the State University College of Forestry, Syracuse, N. Y.

A native Californian, McGahan received his B. A. from the University of California in 1948, and will be awarded his Ph.D. there in September 1951. McGahan, a plant anatomist, has specialized in micro-chemical and micro-technique studies of wood and bark.

Development of "simple, efficient, and controllable techniques" for loosening bark of living trees is the aim of the debarking studies started at the college in May. The project is jointly sponsored by the College of Forestry and nine pulp and paper companies and one chemical company, with the cooperation of other pulp and paper firms.

Hoskins Receives Awards from Junior Chamber of Commerce

Robert N. Hoskins, industrial forester, Seaboard Air Line Railroad, is the recipient of a meritorious award for services to agriculture and conservation given by the national Junior Chamber of Commerce, and a special award, granted for the first time this year by the Norfolk, Va. Junior Chamber.

For the past two years Hoskins has been state chairman and national vice chairman for agriculture and conservation in the Jaycee program.

Canadian Meeting Draws U.S. Foresters

Members of the Society of American Foresters have been invited by the Canadian Institute of Forestry (Canadian Society of Forest Engineers) to attend its 43rd annual meeting at Banff, Alberta, October 11, 12, and 13.

Theme of the meeting will be multiple use of forest areas. In addition to papers and reports on the subject theme, the Rocky Mountain Section of the C.I.F. has provided for field excursions to the Calgary Power Company's forestry developments and the various scenic areas.

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Box A, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, B.S.F. 1948, 31 years old, single, desires permanent position with company progressive in timber management. Three years experience in managment of southern pine. References and details upon request.
Box B, JOURNAL OF FORESTRY, Mills Building, Washington 6, D. C.

Forestry graduate, BSF in general forestry, MSF with major in wood utilization and minor in economics, experience in West Africa in charge of purchasing organization buying mahogany and secondary species. World War II veteran, age 27, married with one child, desires permanent position with a future in an industrial or state forestry organization which will combine field work and administrative duties. References and detailed information upon request.
Box C, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, Penn State graduate, age 28, married, 2 children, desires permanent position in forest management or utilization fields. Seven years' experience U. S. Soil Conservation Service, farm forestry, management, portable sawmill, chain saw, and wood chipper, planting, and soil conservation practices. Member SAF. References and detailed information on request.
Robert A. Schrack, 1704 Main St., W. Warwick, R. I.

Nurseryman-Forester, B.S.F., desires position with state or industrial organization producing tree planting stock. 23 years experience in reforestation and tree nursery management. Member S.A.F. Details upon request.
Box D, Journal of Forestry, Mills Building, Washington 6, D. C.

Graduate forester, 37, now employed supervisory capacity wood-working industry desires relocate for better opportunity. 15 years government and industrial experience New England and South Central areas. Prefer industrial, consider other possibly investment deal small enterprise needing help. Experience includes silviculture, reforestation, sawmilling and logging, cruising, mapping, kiln drying, timber buying, practical personnel, labor relations, production supervision.
Box E, Journal of Forestry, Mills Building, Washington 6, D. C.

New Experimental Forest

Establishment of the Pacific Northwest's twelfth federal experimental forest has been announced by Robert W. Cowlin, director of the Pacific Northwest Forest and Range Experiment Station, Portland.

Named the South Umpqua Experimental Forest, the 4,500-acre research unit was created so that Forest Service researchers could study how best to manage the mixed conifer timber types of southwestern Oregon. Emphasis will be on pine management, especially that of sugar pine.

Located on the South Umpqua river, 20 miles northeast of Tiller, the experimental tract is typical of a large area where the Douglas-fir forests, extending from the north, meet and intermingle with the pine forests characteristic of California.

The estimated 109 million board feet of timber on the tract—mainly Douglas-fir, ponderosa pine, and sugar pine—will be utilized, but cutting methods will vary in an effort to develop guides for cutting practices that will produce high and continuing yields of timber in the mixed stands of the area.

Development and administration of the new experimental forest will be handled by Lloyd Hayes, leader of the Siskiyou-Cascade Research Center, and Robert Aufderheide, supervisor of the Umpqua National Forest. Both are headquartered at Roseburg, Ore.

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West Virginia Names Forester

Promotion of Assistant State Forester Hays Helmick to the post of State Forester has been announced by Director of Conservation C. F. McClintic. Helmick succeeds Wilson B. Sayers, who resigned last February.

Dr. McClintic explained that appointment of a new state forester was delayed because it was necessary to work with the Merit System Council to change certain requirements for the position. Under the former requirements it seemed impossible to obtain the services of a qualified man in the established salary range.

Helmick first joined the conservation commission in June of 1941 shortly after he had been graduated from the Forestry School of West Virginia University. He served as assistant custodian of Cabwaylingo State Forest, and as county forester. During World War II he was in the navy three and a half years, emerging with the rank of lieutenant. He returned to the conservation commission in the capacity of assistant state forester in charge of state forests.

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Lake States Forests Undergoing Changes

Significant changes in forest conditions have occurred in parts of the Lake States region during the past 13 years according to a survey report released by the Lake States Forest Experiment Station on July 26. The report, *Changes in Forest Conditions 1936-1949, North Central Minnesota and Upper Peninsula of Michigan* by R. N. Cunningham compares statistics from two forest surveys in which the station participated.

A favorable trend, recorded in both districts, has been a "thickening up" of seedling, sapling, and pole stands, largely a result of improved fire protection. Whereas half of the seedling and sapling stands and nearly two-thirds of the pole stands were recorded as poorly stocked in the first survey, the proportion poorly stocked dropped to 25 for seedling-sapling and 45 for poles in Minnesota. The improvement on restocking areas in Michigan was even greater.

An unfavorable trend has been the sharp decline in old-growth saw timber in Upper Michigan. In this district the acreage of large saw timber declined from 1,093,000 acres in 1936 to about 518,000 acres currently, a drop of more than 50 percent. Total volume of saw timber on all lands in the Upper Peninsula district declined approximately 45 percent.

Weyerhaeuser Reports Progress

During the past five years, Weyerhaeuser Timber Company has invested more than 100 million dollars in new plants, equipment, and roads, according to the company's annual report. In 1950 alone, such investments by the company totaled more than 19 million dollars.

The annual report shows also that Weyerhaeuser last year paid $49,616,836 in wages and salaries compared with $48,536,442 the previous year. At the end of the year, number of employees totaled 13,609 compared with 12,708 at the end of 1949.

Taxes paid by the company totaled $25,724,591 in 1950, amounting to $1,890 per employee. Its tax bill in 1949 was $19,580,693.

Sales of forest products during the year totaled $176,587,047. Net income was reported at $32,908,595 or $5.27 per share, adjusted to reflect a stock split of two for one during the year.

J. P. Weyerhaeuser, Jr., president of the company, points out encouraging gains made by new and expanded plants.

"The Springfield (Oregon) sawmill, which came into production in 1949, increased its output steadily throughout 1950," he said, "and is expected to show further improvement in the coming year. In 1950 the plywood plant at Longview (Wash.) produced 23 percent more plywood. A greater quantity of kraft pulp was produced at Longview, and the Springfield container board plant which started in August, 1949 improved steadily in efficiency."

The company's long-range program for making the fullest possible use of its timber crops is stressed in the report.

"Emphasis in forestry research is shifting," Weyerhaeuser said, "toward the problems of reproducing, protecting, growing, and improving new timber crops as the virgin forests are harvested and replaced by young trees. The transition from dependence on old growth timber to an economy based on newly grown tree crops is well under way."

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New BLM Assistant Director

William Pincus of the Bureau of the Budget has been appointed to the position of assistant director of the Bureau of Land Management.

Mr. Pincus fills the vacancy created when William Zimmerman, Jr., former assistant director, was recently named BLM associate director, succeeding Roscoe E. Bell who is now regional administrator in Portland.

Mr. Pincus' government career began June 1941 in the field service of the War Department. In August 1944 he joined the Bureau of the Budget as administrative analyst. From January 1948 till March of the following year he served with the Commission on Organization of the Executive Branch. Prior to his appointment as assistant director of the Bureau of Land Management, Pincus was organization and methods examiner in the Bureau of the Budget.

Mr. Pincus holds a B. A. degree in government from Brooklyn College and received his M. A. in public administration from American University. He has also done graduate work at Columbia University and is now studying at George Washington Law School.

Maine Dedicates Penobscot Forest

A 3,800-acre experimental forest established a year ago by nine New England pulp and paper companies was officially dedicated at the University of Maine on June 23.

Known as the Penobscot Experimental Forest, the 3,800-acre property has been turned over to the U. S. Forest Service under a long-term lease agreement. The land will be used primarily for experiments in management of spruce-fir forest lands. The tract is located about eight miles from Bangor.

Eugene H. Clapp, president of Penobscot Chemical Fibre Co., hailed the experimental forest as "the first instance in the annals of American forestry that a group of wood-using industries have united to purchase a timberland tract for lease to the government to do such work. It is felt by all concerned," his statement continued, "this 3,800-acre area is sufficiently large and varied so that participating companies, the federal Forest Service, and the general public all will gain by results obtained."

The Penobscot tract was accepted for the federal government by Edward C. Crafts of the U. S. Forest Service. Crafts pointed out that the forest is unique in the United States and is a practical example of industry and government working together in the field of forest research.

V. L. Harper, now assistant chief of the Forest Service in charge of the division of research, reviewed some of the forest problems of the region and praised the cooperative work of private and public research programs now underway.

The newly dedicated experimental forest will be operated by the Northeastern Forest Experiment Station's Penobscot Research Center at Bangor. The forestry department of the University of Maine is cooperating with the research center.

Assigned to Philippines

Winslow L. Gooch of West Point, Virginia is now in the Philippines on an assignment sponsored by the U. S. Department of State. One of his duties is to advise the Director of Forestry at Manila with respect to setting up a forest products laboratory for the Islands. Mr. Gooch expects to be in the Philippines for a couple of years.

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Chief Engineer Upchurch (right) gives message to operator for general broadcast to all game wardens via Arkansas's RCA Microwave relay and 2-way radio system.

Twenty-five miles of costly pole-line construction, easements, and maintenance were eliminated by an RCA microwave link in the 2-way radio system recently set up by the Arkansas Game and Fish Commission.

Radio signals are beamed from capitol dome 15 air miles by RCA Microwave to a transmitter and relay station atop Chenault Mountain. From here state-wide FM 2-way radio contact is maintained with several outlying fixed stations and with 175 mobile stations in autos, trucks, and jeeps of far-ranging game wardens . . . *all at a saving of $36,500 and with no pole-line maintenance.*

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1950 Burn Totals 15½ Million Acres

More than 208,400 fires burned 15,518,540 acres of forest land in the United States during 1950. The acreage burned in 1950 was approximately the same as that in 1949 when 193,774 fires burned 15,397,419 acres, according to Lyle F. Watts, chief, U. S. Forest Service.

Only two-thirds of 1 percent of the forest area having state and federal protection was burned last year whereas 17.7 percent of the unprotected forest land was swept by fire. Of the total forest area burned in the United States, an estimated 11,720,000 acres, or 76 percent, was on privately owned forests having no organized fire protection.

The 1950 summary shows that burning conditions were unusually severe in many parts of the South, Southwest, and California. In the 11 states lying south of Virginia, 13,674,677 acres of woodland were burned over. Of this amount, nearly 11,000,000 acres were in areas having no organized protection.

California had a bad fire season last year because of drought conditions. A total of 488,590 acres burned in 1950, or more than double the total of 215,805 acres that burned in 1949.

New AFPI School Bibliography

Teachers and school administrators interested in conservation will find American Forest Products Industries' 1951-52 Bibliography a storehouse of useful information. The 16-page publication lists a variety of booklets, charts, maps, posters, film strips, and a motion picture now available for school room use. Back cover of the bibliography is an order blank designed for ready use by busy teachers.

All materials listed are supplied free of charge by American Forest Products Industries. Many booklets and folders are available in classroom quantities.

Among the educational aids offered this year is a manual specially designed for use by teachers. This manual suggests a variety of interesting ways to incorporate forestry and conservation in regular classroom work.

Copies of the bibliography are being distributed to county superintendents, school principals and teachers in all 48 states. Additional copies are available on request from American Forest Products Industries, 1319 Eighteenth Street, N. W., Washington 6, D. C.

Natural Resources Committee of Chamber of Commerce

The Chamber of Commerce of the United States has announced the personnel of its Natural Resources Committee for the coming year. Chairman of the committee will be A. L. Lynn, vice president, Island Creek Coal Co., Huntington, West Va., a member of the Chamber's board of directors.

The 38-man committee contains a balanced representation of the extractive natural resources industries and the related fields of energy supply, conservation and federal land administration. Commenting on the committee program for the year ahead, Chairman Lynn stated: "The natural resources industries are being called upon to meet the demands of both civilian and military production. They are working under trying conditions, and in the face of increasing controls, to furnish the fuels, energy and raw materials that form the backbone of our industrial economy. The committee will work for cooperation between industry and government — federal, state and local—in the conservation, development and use of the country's natural resources."

The first meeting of the new committee is scheduled for early October.

Members of the committee's lumber, pulp and paper group are: Leo V. Bodine, vice president, Weyerhaeuser Sales Co., St. Paul, Minn.; Abbott M. Fox, Abbott Fox Lumber Co., Iron Mountain, Mich.; A. J. Glassow, vice president and general manager, Brooks-Scanlon, Inc., Bend, Ore.; Q. T. Hardtner, president, The Urania Lumber Co.; Urania, La.; Harry T. Kendall, chairman of the board, Weyerhaeuser Sales Co., St. Paul, Minn.; W. M. Oettmeier, president, Superior Pine Products Co., Fargo, Ga.; W. S. Rosecrans, president, W. S. Rosecrans, Inc., Los Angeles, Calif; Laurence F. Whittemore, president, Brown Co., Berlin, N. H.

Those concerned with grazing and federal lands are: Frederick P. Champ, Logan, Utah; Floyd W. Lee, president, Fernandez Co., Albuquerque, N. Mex.; Leslie A. Miller, Cheyenne, Wyo.; E. L. Moulton, president, Charles Ilfeld Co., Albuquerque, N. Mex.; William B. Wright, Marys River Ranch, Deeth, Nev.

The conservation group is: Paul Clement, secretary, Minnesota Commercial Men's Assn., Minneapolis, Minn.; James R. Cudworth, dean, College of Engineering, University of Alabama.

Other interests represented are, water and power, minerals and metals, coal, and oil and gas.

Wildlife's Dollar Value Studied

How much is wildlife worth annually in dollars and cents? Sportsmen who fish, trap, and hunt in Lewis County, New York, are being quizzed by State University College of Forestry, Syracuse, to find the answer.

The college is asking fishing, trapping, and hunting-license holders how much money they spend in Lewis County stores, service stations, restaurants, hotels, and other business places. The dollar value of fish and game as food is also being investigated.

The wildlife study is part of an intensive college survey of forest land use in Lewis County. The survey will be followed by a "local action period." when residents begin taking practical economic and social advantage of the findings and recommendations of the foresters.

Residents are being queried on how much they earn from wildlife through fur farms, trapping, bait selling, boat rentals, guide fees, sales of sports gear, and providing accomodations for visiting sportsmen.

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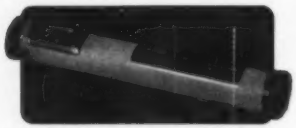

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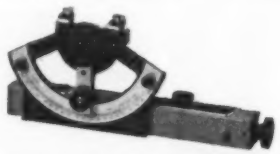

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National Parks Advisory Board

Secretary of the Interior Oscar L. Chapman has named Maj. Gen. U. S. Grant, 3rd, of Washington and Dr. Turpin C. Bannister of Urbana, Ill. as members of the Advisory Board on National Parks, Historic Sites, Buildings and Monuments.

Gen. Grant is president of the American Planning Association and also of the National Council of Historic Sites and Buildings. Dr. Bannister is head of the department of architecture, University of Illinois.

General Grant and Dr. Bannister succeed Dr. Fiske Kimball, director of the Philadelphia Museum of Art, and Dr. Herbert E. Bolton of the University of California whose terms expired on June 30. Both have been given appointments as National Park Service collaborators.

The advisory board, established by the Historic Sites Act of 1935, consists of 11 members distinguished in various special fields. They advise the Secretary of the Interior on all matters affecting the national parks and other areas administered by the National Park Service.

Members of the board are: Charles G. Sauers of River Forest, Ill., superintendent of the Cook County Forest Preserve District, chairman; Dr. Theodore C. Blegen of Minneapolis, Minn., vice chairman, Dr. Frank M. Setzler, Washington, D. C., secretary; Dr. Harold E. Anthony, New York City; Dr. Ralph W. Chaney, Berkeley, Calif.; Bernard A. DeVoto, Cambridge, Mass.; Tom Wallace, Louisville, Ky.; Alfred A. Knopf, New York City; and Charles G. Woodbury, Washington, D. C.

Chippewa Forest Receives Citation from Secretary

The first citation to a forest was made July 2 by Secretary of Agriculture Charles F. Brannan. The Superior Service Award, in the past made only to those individual members of the Department of Agriculture, and to very few of them, was granted to the Chippewa National Forest in northern Minnesota.

The citation reads:

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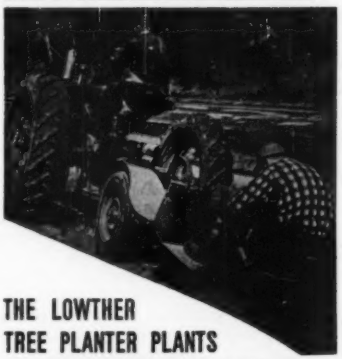

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Pathologist to Point Four Post in Liberia

Dr. Thomas S. Buchanan, forest pathologist, is a member of the U. S. government's economic mission for developing the agriculture of Liberia. The assignment was made at the request of the government of Liberia and in cooperation with the Technical Cooperation Administration, Department of State.

Dr. Buchanan is the second Department of Agriculture specialist to go to Liberia under the Point Four program. Dr. Clayton R. Orton, a former dean of the West Virginia College of Agriculture, has been assisting the Liberian Department of Agriculture and Commerce in developing plans for an expanded program of agricultural research and extension education since last September.

Dr. Buchanan was a forestry pathologist in Oregon and Georgia for the Department of Agriculture's Bureau of Plant Industry, Soils, and Agricultural Engineering for more than 16 years. In 1944, he entered the armed forces and served with the U. S. Marine Corps for two years. At the end of the war he joined the staff of the Weyerhaeuser Timber Company in their Longview, Wash., development department. Since 1947, he has been an associate professor at the University of Idaho's School of Forestry.

AFPI Photographic Catalog

A catalog of outstanding forestry photographs is being distributed to newspaper, magazine, and book publishers throughout the country by American Forest Products Industries, Inc.

The new catalog lists 85 different forestry scenes. Prints of each picture listed are available on a loan basis to editors and publishers without charge.

The eight-page catalog is regionalized with two page sections devoted to the southern states, northen states, and western states. For a cover picture AFPI selected an impressive view of the Mt. Rushmore memorial in South Dakota.

Copies of the new AFPI picture brochure are available without charge on request. Letters should be addressed to American Forest Products Industries, Inc., 1319 Eighteenth Street N. W., Washington 6, D. C.

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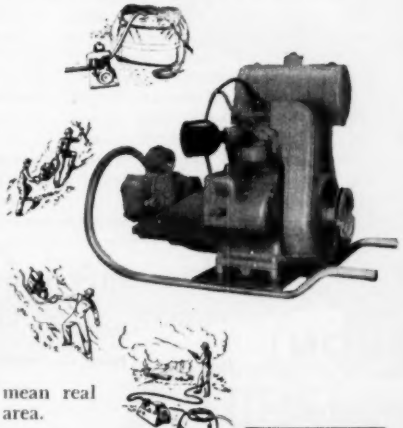

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Hertzler on Flood Control Work

R. A. Hertzler, chief of the Forest Utilization Service of the Southeastern Forest Experiment Station, has been appointed flood control survey officer on the technical staff of the Secretary of Agriculture. In this assignment he will also work with the Federal Inter-Agency River Basin Committee. This committee makes plans for the development of such river basins as the Columbia and the Missouri and coordinates the plans of all departments of the government with regard to structures and activities for power, flood control, irrigation, and public health. Such plans are submitted to Congress as a coordinated program of river basin development.

He is a member of the executive board of the Forest Products Research Society and, as a charter member, helped organize the Virginia-Carolinas Section. He is also a member of the American Association for the Advancement of Science, the American Society of Civil Engineers, the Society of American Foresters, the Western Carolina Engineers Club, and the American Geophysical Union.

Reents Named Plywood Head

Henry G. Reents has been named superintendent of the plywood manufacturing department of The Long-Bell Lumber Company at Weed, Calif. Reents takes over the duties of A. J. Myers, who has been promoted to superintendent of plywood manufacture for Long-Bell.

Before taking over his new duties, Reents served as assistant superintendent of the Weed plywood operation. He is a graduate of the school of forestry at the University of California, class of 1938, and was employed by the U. S. Forest Service in the Tahoe National Forest before joining Long-Bell in 1939.

Seaboard Adds Wood Rack Cars

The Seaboard Air Line Railroad has recently completed a construction program of 800 all-steel wood rack cars at a cost of $2,800,000 and now has in service a total of 3,008 of these modern cars for the use of the paper manufacturing industry in its territory.

The cars were built at the line's shops in Portsmouth, Va., and were turned out at the rate of about 10 a day on an assembly line basis. Seaboard now has 2,111 wood rack cars of 40-ton capacity and 897 of 50-ton capacity.

Increasing production of paper mill products in the Southeast, and a consequent greater demand for pulpwood transportation, led the Seaboard to increase its number of wood rack cars.

Fifteen years ago the Seaboard did not haul 3,000 cars of pulpwood a year, but last year it moved 101,452 carloads. An indication of the growth of the paper manufacturing industry along the Seaboard may be obtained in the following yearly average totals of cars of pulpwood moved since 1931—from 1931 through 1935, 702 cars yearly; 1936 through 1940, 22,500 cars yearly; 1941 through 1945, 72,200 cars yearly; and 1946 through 1950, 97,500 cars a year.

Penta Specifications Available

An up-to-date compilation of specifications for the use of pentachlorophenol wood preservative issued by state, federal, and armed forces agencies is available from Monsanto Chemical Company, St. Louis 4, Mo.

The 17-page bulletin contains 60 specifications and an abstract of each, including several by utilities, associations, and regional groups. They range from specifications for the chemical itself to formulations for treating structural lumber and poles.

Harry T. Gisborne Honored

Gisborne Mountain on the Priest River Experimental Forest in northern Idaho was formally dedicated July 8 in the presence of a number of Inland Empire foresters. Named after the late Harry T. Gisborne, pioneer forest fire researcher, the mountain was the scene of many of his studies.

Gisborne was employed by the Northern Rocky Mountain Forest and Range Experiment Station of the Forest Service in 1922. He was the first full-time forest fire research worker in the United States. He was actively engaged in this work at the time of his death in 1949. Gisborne blazed the trail in the field of forest fire danger measurement. The now well-known fire danger meters used in most regions are patterned after one developed by him in 1931. Shortly before his death Gisborne wrote an important chapter on forest protection in the Society of American Foresters, publication, *Fifty Years of Forestry in the U.S.A.*

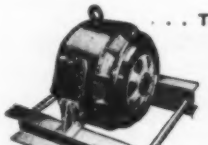
A bronze plaque has been embedded in a large rock at the summit of Gisborne Mountain. It bears the inscription: Harry T. Gisborne, 1893-1949, Inspiring, Enthusiastic, Far-Seeing, Pioneer in Forest Fire Research.

The dedication address was given by A. A. Brown, chief, Division of Forest Fire Research of the U. S. Forest Service.

Wisconsin Forest Crop Law

Wisconsin now has 2,343,912 acres entered under the state forest crop law, dedicated to growing timber. Of the total acreage, 2,116,799 acres were entered by counties and 227,112 acres by private land owners.

A revision of the law now permits entry under the act of land outside the forest counties; such entries now account for 6,926 acres of the total.



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